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The McMahon Bill and the State Department Report

The twin foci of our interest remain the McMahon bill on national regulation, and the Acheson-Lilienthal report on international control of atomic energy.

The bill has now been reported out of the Special Senate committee to the floor of the Senate. The considerable changes and additions which the original text has undergone as a result of committee deliberations will require careful study.

As a basis for this study, we reprint in this issue a digest of the bill, including the full text of the most important new or altered provisions.

The first impression is that the bill, in its present state, is a compromise which provides a workable basis for research and development in the field, particularly if a competent and independent Atomic Energy Commission is appointed.

* * *

The public response to the State Department Report has on the whole been gratifying—ranging from cautious approval to enthusiastic support. We reprint some authoritative comments on pages 10 and 12. The attitude of the Atomic Scientists of Chicago has been expressed in the following statement, jointly adopted by the Executive and Advisory Committees:

"The Atomic Scientists of Chicago emphatically endorse the main ideas and proposals in the State Department Committee report on International Control of Atomic Energy.

"The report proposes a bold but workable solution; inaction and an unplanned drift into international competition would be much more dangerous. Instead of searching cautiously for a minimum of action, the report outlines an aggressive policy of planned progress and international cooperation.

"The report recommends a multiplicity of safeguards which will render evasion or violation of international control difficult. These safeguards include complete control of raw materials, and of the production of fissionable materials, by the international authority provisions for non-dangerous designs for power-producing units in private or national hands, denaturing of dangerous materials, inspection of key plants, and exchange of information on scientific and technical activities.

"No one of these proposals offers in itself complete safety. But taken together, they constitute the best scheme one can devise at this time.

"If the constructive and imaginative spirit of the State Department report is compared with the 'Maginot-line' mentality of 'keeping the secret,' one can hardly doubt in which direction the hope for safety lies."

* * *

The most powerful argument in support of the report proves to be the question: what are the alternatives? One aspect of this question is illuminated by the article by Marshak, Teller and Klein in thie issue. Not only a failure to establish an assured international control of atomic armaments and to eliminate war as a possibility to be seriously reckoned with in long-range national planning, but even a delay of a few years in achieving these aims, will make drastic re-organization of the whole economic and social life of the United States an urgent matter of self-preservation.

UNIV. OF MICH.

Medical and Industrial Uses of Pile Products*

Tantalizing as the prospects of large-scale atomic power plants are, it may very well be that power will not be the most important product derived from the operation of atomic energy units ("piles"). The prospects of power are actually of less immediate importance than are the possibilities opened up through the production of radioactive substances even in small piles. In other words, piles will be useful and important for the production of radioactive substances and penetrating radiations even during the period in which power piles are not economically practical. Such radioactive substances have been made before, in minute amounts, by means of cyclotrons and similar apparatus, but the use of a pile will make possible the manufacture of tremendously larger amount of these materials. While all the uses of radioactive substances cannot be foreseen at the present time, enough work was done before the war with the tiny amounts available then to point out the directions future work may take.

GENERAL FIELDS OF USEFULNESS

Probably the most important uses of these new substances will be in the field of research—research in medicine and biology, in industrial processes, and in pure science. Developments in all of these fields will be greatly accelerated, for the availability of large amounts of radioactive substances will put into the hands of research men a new and most powerful tool—one which will make possible the gathering of knowledge unattainable by any other means. Radioactivity gives promise of being as important to medical and biological research as was the microscope, as important to chemical research as was the chemical balance, and as important to physical research as was the spectroscope.

In this new era of rapid scientific and technological development, the acceleration of all kinds of research means that advances in the well-being of man will be made more rapidly, that cures for diseases will be discovered more rapidly, and that new products and materials will be developed, which may give rise to great new industries comparable in size and importance to the synthetic rubber, the plastics, or the light metals industries.

From discoveries made before the war, it was already evident that radioactive substances will find direct use in medicine for the treatment of certain diseases, and that in industry they will enable many processes to be carried on more efficiently and economically.

RADIATIONS AND SUBSTANCES PRODUCED BY A PILE

Thick concrete or steel shields are built around piles as protection against their intense gamma and neutron radiations, similar to those which injured and killed so many people in the atomic explosions at Hiroshima and Nagasaki. These radiations can be made available for controlled medical or industrial use through ports cut in the shielding. The radiation is emitted as a beam through these ports. The use of these radiations is confined to the vicinity of the pile. It is an important extension of the usefulness of the pile that it can also be used to manufacture highly concentrated portable sources of penetrating radiations.

(Continued on page 16)

* Reprinted from "The Atomic Bomb," by the Atomic Scientists of Chicago, Chicago, 1946.

THE REVISED McMAHON BILL . . .

The Bill, S. 1717, which was reported out by the Senate Special Committee on Atomic Energy on April 11, is based on the draft introduced on December 20 of last year by Senator McMahon. However, it has been changed in many important provisions, and has grown to almost double its initial size as a result of the Committee deliberations. We print the official digest of the current version, presenting the full text of the most important provisions, particularly those which distinguish the present bill from the original McMahon draft. These sections are printed in different type to set them off from the rest.

POLICY (SEC. 1)

It is declared to be the policy of the people of the United States that the development and utilization of atomic energy is to be directed toward improving the public welfare, increasing the standard of living, strengthening free competition among private enterprise and promoting world peace. This policy is at all times subject to the paramount objective of assuring the national security.

To carry out these objectives this bill provides for Government control of the production, ownership and use of fissionable material and for programs of information, production, research and development. It establishes an administrative agency to exercise this control and promote this development subject to international agreements of the United States and to such further legislation as the Congress may enact. It is noted that legislation passed at this time will undoubtedly need reconsideration and change from time to time.*

ORGANIZATION (SEC. 2)

A. Atomic Energy Commission

(1) There is hereby established an Atomic Energy Commission (herein called the Commission), which shall be composed of five members. Three members shall constitute a quorum of the Commission. The President shall designate one member as Chairman of the Commission.

(2) Members of the Commission shall be appointed by the President, by and with the advice and consent of the Senate. In submitting any nomination to the Senate, the President shall set forth the experience and the qualifications of the nominee. The term of office of each member of the Commission taking office prior to the expiration of two years after the date of enactment of this Act shall expire upon the expiration of such two years. The term of office of each member of the Commission taking office after the expiration of two years from the date of enactment of this Act shall be five years, except that (A) the terms of office of the members first taking office after the expiration of two years from the date of enactment of this Act shall expire, as designated by the President at the time of appointment, one at the end of three years, one at the end of four years, one at the end of five years, one at the end of six years, and one at the end of seven years, after the date of enactment of this Act; and (B) any member appointed to fill a vacancy occurring prior to the expiration of the term for which his predecessor was appointed, shall be appointed for the remainder of such term. Any member of the Commission may be removed by the President for inefficiency, neglect of duty, of malfeasance in office. Each member, except the Chairman, shall receive compensation at the rate of $15,000 per annum; and the Chairman shall receive compensation at the rate of $17,500 per annum. No member of the Commission shall engage in any other business, vocation, or employment than that of serving as a member of the Commission.

(4) There are hereby established within the Commission—

(A) A General Manager, who shall discharge such of the administrative and executive functions of the Commission as the Commission may direct. The General Manager shall be appointed by the President by and with the advice and consent of the Senate, and shall receive compensation at the rate of $15,000 per annum. The Commission may make recommendations to the President with respect to the appointment or removal of the General Manager.

(B) A Division of Research, a Division of Production, a Division of Engineering, and a Division of Military Application. Each division shall be under the direction of a Director who shall be appointed by the Commission, and shall receive compensation at the rate of $14,000 per annum. The Commission shall require each such division to exercise such of the Commission's powers under this Act as the Commission may determine, except that the authority granted under section 3 of this Act shall not be exercised by the Division of Research.

B. General Advisory Committee

There shall be a General Advisory Committee to advise the Commission on scientific and technical matters relating to materials, production, and research and development, to be composed of nine members, who shall be appointed from civilian life by the President. Each member shall hold office for a term of six years, except that (1) any member appointed to fill a vacancy occurring prior to the expiration of the term for which his predecessor was appointed, shall be appointed for the remainder of such term; and (2) the terms of office of the members first taking office after the date of the enactment of this Act shall expire, as designated by the President at the time of appointment, three at the end of two years, three at the end of four years, and three at the end of six years, after the date of the enactment of this Act. The Committee shall designate one of its own members as Chairman. The Committee shall meet at least four times in every calendar year. The members of the Committee shall receive a per diem compensation of $50 for each day spent in meetings or conference, and all members shall receive their necessary traveling or other expenses while engaged in the work of the Committee.

C. Military Liaison Committee

There shall be a Military Liaison Committee consisting of representatives of the Departments of War and Navy, detailed or assigned thereto, without additional compensation, by the Secretaries of War and Navy in such number as they may determine. The Commission shall advise and consult with the Committee on all atomic energy matters which the Committee deems to relate to military applications, including the development, manufacture, use, and storage of bombs, the allocation of fissionable materials for military research, and the control of information relating to the manufacture or utilization of atomic weapons. The Commission shall keep the Committee fully informed of all such matters before it, and the Committee shall keep the Commission fully informed

*Section b(5) of the original draft, which added to the purposes of the act "a program for simultaneous study of the social, political and economic effects of the utilization of atomic energy" has been deleted.

of all atomic energy activities of the War and Navy Departments. The Committee shall have authority to make written recommendations to the Commission on matters relating to military applications from time to time as it may deem appropriate. If the Committee at any time concludes that any action, proposed action, or failure to act of the Commission on such matters is adverse to the responsibilities of the Departments of War or Navy, derived from the Constitution, laws, and treaties, the Committee may refer such action, proposed action, or failure to act to the Secretaries of War and Navy. If either Secretary concurs, he may refer the matter to the President, whose decision shall be final.

RESEARCH (SEC. 3)

A. Research Assistance

The Commission is directed to exercise its powers in such manner as to insure the continued conduct of research and development activities in the fields specified below by private or public institutions or persons and to assist in the acquisition of an ever-expanding fund of theoretical and practical knowledge in such fields. To this end the Commission is authorized and directed to make arrangements (including contracts, agreements, grants-in-aid, and loans) for the conduct of research and development activities related to—

(1) nuclear processes;

(2) the theory and production of atomic energy, including processes, materials and devices related to such production;

(3) utilization of fissionable and radioactive materials for medical, biological, health, or military purposes;

(4) utilization of fissionable and radioactive materials and processes entailed in the production of such materials for all other purposes, including industrial uses; and

(5) the protection of health during research and production activities.

B. Research by the Commission

The Commission is authorized and directed to conduct, through its own facilities, activities and studies of the types specified in sub-section (A) above.

PRODUCTION OF FISSIONABLE MATERIAL (SEC. 4)

The commission is required to own and operate all facilities for the production of fissionable material. Management contracts are permitted; private ownership or operation is expressly forbidden, except for facilities producing small amounts incident to research and development which are not sufficient to produce an atomic bomb or other atomic weapon. In cases where the commission certifies to the Comptroller General that it is necessary in the interest of common defense and security, the commission may make contracts without advertising for competitive bids.

CONTROL OF MATERIALS (SEC. 5)

A. Fissionable Materials

(1) Definition. — As used in this Act, the term "fissionable material" means plutonium, uranium enriched in the isotope 235, any other material which the Commission determines to be capable of releasing substantial quantities of energy through nuclear chain reaction of the material, or any material artificially enriched by any of the foregoing; but does not include source materials, as defined in section 5 (B).

(2) Government Ownership of all Fissionable Material. — All right, title, and interest within or under the jurisdiction of the United States, in or to any fissionable material, now or hereafter produced, shall be the property of the Commission, and shall be deemed to be vested in the Commission by virtue of this Act. Any person owning any interest in any fissionable material at the time of the enactment of this Act, or owning any interest in any material at the time when such material is hereafter determined to be a fissionable material, or who lawfully produces any fissionable material incident to privately financed research or development activities, shall be paid just compensation therefor. The Commission may, by action consistent with the provisions of paragraph (4) below, authorize any such person to retain possession of such fissionable material, but no person shall have any title in or to any fissionable material.

(3) Prohibition. — It shall be unlawful for any person, after sixty days from the effective date of this Act to (A) possess or transfer any fissionable material, except as authorized by the Commission, or (B) export from or import into the United States any fissionable material, or (C) directly or indirectly engage in the production of any fissionable material outside of the United States.

(4) Distribution of Fissionable Material. — Without prejudice to its continued ownership thereof, the Commission is authorized to distribute fissionable material, with or without charge, to applicants requesting such material (A) for the conduct of research or development activities either independently or under contract or other arrangement with the Commission, (B) for use in medical therapy, or (C) for use pursuant to a license issued under the authority of section 7. Such material shall be distributed in such quantities and on such terms that no applicant will be enabled to obtain an amount sufficient to construct a bomb or other military weapon. The Commission is directed to distribute sufficient fissionable material to permit the conduct of widespread independent research and development activity, to the maximum extent practicable. In determining the quantities of fissionable material to be distributed, the Commission shall make such provisions for its own needs and for the conservation of fissionable material as it may determine to be necessary in the national interest for the future development of atomic energy. The Commission shall not distribute any material to any applicant, and shall recall any distributed material from any applicant, who is not equipped to observe or who fails to observe such safety standards to protect health and to minimize danger from explosion or other hazard to life or property as may be established by the Commission, or who uses such material in violation of law or regulation of the Commission or in a manner other than as disclosed in the application therefor.

B. Source Material

Source material is defined as meaning uranium, thorium or any other material which the commission considers to be essential to the production of fissionable materials, including ores if they contain any of the foregoing materials in such concentrations as the commission may determine. Transfer or possession of source materials after removal from place of origin in nature will be by license only. The commission may require reports of ownership, possession, extraction, refining and shipment of source materials after removal from place of origin but not in cases where quantities are unimportant or reporting will discourage independent prospecting.

The commission is authorized to acquire, through purchase, requisition, condemnation or otherwise, supplies of source ma-

terial or any interest in real property containing deposits of source material. Just compensation will be made for all property acquired. It may also carry on such exploratory operations, with the consent of the owners involved, and may carry out investigations and inspections for source material with or without the consent of the owners involved.

All source materials in deposits in public lands are reserved to the United States and source materials privately mined in such lands, unless in unimportant amounts, become the property of the commission in return for just compensation.

C. By-Products

(1) Definition. — As used in this Act, the term "by-product material" means any radioactive material (except fissionable material) yielded in or made radioactive by exposure to the radiation incident to the processes of producting or utilizing fissionable material.

(2) Distribution. — The Commission is authorized to distribute, with or without charge, by-product materials to applicants seeking such materials for research or development activity, medical therapy, industrial uses, or such other useful applications as may be developed. In distributing such materials, the Commission shall give preference to applicants proposing to use such materials in the conduct of research and development activity or medical therapy. The Commission shall not distribute any by-product materials to any applicant, and shall recall any distributed materials from any applicant, who is not equipped to observe or who fails to observe such safety standards to protect health as may be established by the Commission or who uses such materials in violation of law or regulation of the Commission or in a manner other than as disclosed in the application therefor.

D. General Provisions

(1) The Commission shall not distribute any fissionable or source material to any person for a use which is not under or within the jurisdiction of the United States or to any foreign government.

(2) The Commission shall establish by regulation a procedure by which any person who is dissatisfied with the distribution or refusal to distribute to him, or the recall from him, of any fissionable or by-product materials or with the issuance, refusal, or revocation of a license to him for the transfer or receipt of source materials may obtain a review of such determination by a board of appeal consisting of three members appointed by the Commission. The Commission may in its discretion review and revise any decision of such board of appeal.

MILITARY APPLICATIONS (SEC. 6)

The commission is directed to engage in developmental work on military applications of atomic energy, to produce atomic weapons in such amounts as the President may annually determine, and to deliver manufactured weapons to the armed forces as directed by the President.

All persons are prohibited from producing any device or equipment to utilize fissionable material as a military weapon except when authorized by the commission or when incident to research and developmental activities.

UTILIZATION OF ATOMIC ENERGY (SEC. 7)

The manufacture of equipment or devices utilizing fissionable material or atomic energy, or the utilization of fissionable material or atomic energy with or without such devices is subject to licensing by the commission. However, no such license may be issued until Congress has had a period of ninety days in which to consider a report on the economic and social effects of such a license which the commission must file with Congress.

INTERNATIONAL ARRANGEMENTS (SEC. 8)

Any provisions of this act or any action taken by the commission under it shall be invalid if they conflict with or are superseded by provisions of any international agreement hereafter approved by the Senate or the Congress. The commission is instructed to perform its functions in such a manner as to give maximum effect to any such international agreements.

PROPERTY OF THE COMMISSION (SEC. 9)

The commission will take over all the resources of the United States or any Government agencies devoted to or related to atomic energy. This includes all atomic weapons, all property of the Manhattan Engineer District, and all patents, materials, plants and facilities, contracts and information relating primarily to atomic energy. The commission is authorized to reimburse States and municipalities for loss of taxes incurred through acquisition of property by the commission.

CONTROL OF INFORMATION (SEC. 10)

(A) Policy. — It shall be the policy of the Commission to control the dissemination of restricted data in such a manner as to assure the common defense and security. Consistent with such policy, the Commission shall be guided by the following principles:

(1) That information with respect to the use of atomic energy for industrial purposes should be shared with other nations on a reciprocal basis as soon as the Congress declares by joint resolution that effective and enforceable international safeguards against the use of such energy for destructive purposes have been established; and

(2) That the dissemination of scientific and technical information relating to atomic energy should be permitted and encouraged so as to provide that free inter-change of ideas and criticisms which is essential to scientific progress.

(B) Dissemination. — The Commission is authorized and directed to establish such information services, publications, libraries, and other registers of available information as it may deem necessary or desirable to provide for the dissemination of information in accordance with subsection (A).

(C) Restrictions.

(1) The term "restricted data" as used in this section means all data concerning the manufacture or utilization of atomic weapons, the production of fissionable material, or the use of fissionable material in the production of power, but shall not include any data which the Commission from time to time determines may be published without adversely affecting the common defense and security.

(2) Whoever, lawfully or unlawfully, having possession of, access to, control over, or being entrusted with, any document, writing, sketch, photograph, plan, model, instrument, appliance, note or information involving or incorporating restricted data—

(a) communicates, transmits, or discloses the same to any individual or person, or attempts or conspires to do any of the foregoing, with intent to injure the United States or with intent to secure an advantage to any foreign nation, upon conviction thereof, shall be punished by a fine of not more than $20,000 or imprisonment for not more than twenty years, or both;

(b) communicates, transmits, or discloses the same to any individual or person, or attempts or conspires to do any of the foregoing, with reason to believe such data will be utilized to injure the United States or to secure an advantage

to any foreign nation, shall, upon conviction, be punished by a fine of not more than $10,000 or imprisonment for not more than ten years, or both.

(3) Whoever, with intent to injure the United States or with intent to secure an advantage to any foreign nation, acquires or attempts or conspires to acquire any document, writing, sketch, photograph, plan, model, instrument, appliance, note or information involving or incorporating restricted data shall, upon conviction thereof, be punished by a fine of not more than $20,000 or imprisonment for not more than twenty years, or both.

(4) Whoever, with intent to injure the United States or with intent to secure an advantage to any foreign nation, removes, conceals, tampers with, alters, mutilates, or destroys any document, writing, sketch, photograph, plan, model, instrument, appliance, or note involving or incorporating restricted data and used by any individual or person in connection with the production of fissionable material, or research or development relating to atomic energy, conducted by the United States, or financed in whole or in part by Federal funds, or conducted with the aid of fissionable material, shall be punished by a fine of not more than $20,000 or imprisonment for not more than twenty years or both.

(5) No person shall be prosecuted for any violation under this section unless and until the Attorney General of the United States has been advised and consulted with the Commission with respect to such prosecution.

(6) This section shall not exclude the applicable provisions of any other laws, except that no Government agency shall take any action under such other laws inconsistent with the provisions of this section.

PATENTS AND INVENTIONS (SEC. 11)

No patent will be issued for any discovery or invention useful solely for the production of fissionable materials or the utilization of fissionable materials or atomic energy for military weapons; but the commission will compensate for such invention or discovery. If the invention or discovery is also useful for other than military purposes, a patent will be issued for those purposes only.

Where the invention or discovery relates to the utilization of atomic energy for non-military purposes and a patent is issued the commission may declare it affected with the public interest in which case persons licensed by the commission may use the patent upon payment to the patentee for such use. The commission is authorized to purchase, take or condemn and make compensation for, any invention or device useful solely in the production of fissionable materials for military weapons.

The commission shall designate a compensation board, the duty of which will be to determine reasonable royalty fees and make awards for any invention or discovery useful in the production of fissionable material.

Provisions are set up whereby any persons aggrieved by the action of the board relative to any award or royalty fee may obtain a review of such action in the Court of Appeals for the District of Columbia.

GENERAL AUTHORITY (SEC. 12)

General authority is given the commission to appoint advisory boards, hire and pay employes, use the services and employes of other agencies, buy and own property and erect buildings. Except where specific exemptions are made by the commission, employes are to be appointed with regard to the civil service laws.

The commission is also authorized to make studies and investigations and to hold hearings and summon witnesses for this purpose. It is to establish safety and health regulations for use of fissionable materials.

The President may in advance exempt any specific action of the commission in a particular matter from the provisions of law relating to contracts. Otherwise the laws concerning audits by the comptroller general are in force.

COMPENSATION FOR PRIVATE PROPERTY (SEC. 13)

Compensation for property acquired by the commission in carrying out the provisions of this act is to be determined by the commission. If the amount determined is unsatisfactory, the claimant may sue the United States in the Court of Claims or any District Court and the commission shall pay him 50 per cent of the amount determined pending settlement of the suit. The commission is authorized to exercise rights of eminent domain and condemnation and to purchase and use property prior to approval of its title by the Attorney General.

JOINT CONGRESSIONAL COMMITTEE (SEC. 14)

A Joint Congressional Committee is established to make continuing studies of the activities of the commission, to reconsider bills introduced into Congress on the subject of atomic energy and to make reports to the Senate and the House of Representatives. The committee is to consist of eighteen members, nine appointed by the Speaker of the House and nine by the President of the Senate, with no more than five from each House being members of the same political party.

ENFORCEMENT (SEC. 15)

This section provides penalties for all violations of the act except dissemination of information. In general, three types of violations are specified:

(1) Those committed with intent to injure the United States or secure advantage to a foreign nation. Maximum penalty: $20,000 fine, twenty years imprisonment or both;

(2) Violations of provisions concerning (A) ownership of production facilities, (B) possession and transfer of fissionable material, (C)manufacture of atomic weapons. When committed without intent to injure the United States or give advantage to a foreign nation, the maximum penalty is $10,000 fine, five years imprisonment, or both.

(3) Violations of provisions concerning reports and records, possession and use of atomic materials and health and safety regulations. When committed without intent to injure the United States or give advantage to a foreign nation, the maximum penalty is $5,000 fine, two years imprisonment, or both.

The commission is given authority to apply to the courts for enjoining or restraining orders or for injunctions.

REPORTS (SEC. 16)

The commission is directed to submit to Congress reports and recommendations for additional legislation in January and July of each year. Recommendations for legislation may be made at other times also.

DEFINITIONS (SEC. 17)

This section establishes definitions for the terms "atomic energy," "United States" and "research and development."

APPROPRIATIONS (SEC. 18)

Such sums as may be necessary and appropriate to carry out the purposes and provisions of the Act are authorized. The unexpended funds of the Manhattan Engineer District are transferred to the commission.

SEPARABILITY OF PROVISIONS (SEC. 19)

If any provision of this act, or its application to any person or circumstance is held invalid, the remainder of the Act is not affected.

SHORT TITLE (SEC. 20)

This Act may be cited as the "Atomic Energy Act of 1946."

Hanson Baldwin on Secrecy Provisions

With the secrecy provisions remaining the most controversial subject in domestic legislation on atomic energy—even after the adoption by the committee of a compromise draft of section 10 (see page 4), the following excerpts from an article of a distinguished military analyst appear of great interest to all concerned with the problem.

* * *

"The national control of atomic energy and secrecy, and espionage regulations are contemporary problems that are part of the broader problem of American military policy and that must be solved by a middle-of-the-road approach.

"The problem of secrecy—not only about atomic energy but also about all political-military matters—is even more important to the future of the country than the exact composition of the Atomic Energy Commission.

"The atomic bomb and recent spy cases in Canada and this country have been seized upon as excuses for attempts to tighten greatly—and dangerously—the espionage laws. The scientists rightly fear that too great an emphasis on secrecy not only would tend to increase international friction but would also hamper the development of science, for mutual exchange of basic scientific information is the keystone of much of our material progress."

* * *

Mr. Baldwin then mentions three—as he designates them—scientific "causes celebres"—the action of Gen. Groves in preventing Dr. Condon from going to Russia in the summer of 1945, the request made to the French scientist, Bertram Goldschmidt, either to acquire American, British or Canadian citizenship, or to severe his relations with the Canadian Project, and the refusal to grant a visa to the famous French physicist, F. Joliot. Mr. Baldwin considers the action taken in the first two cases as warranted, but objects to the third.

* * *

"The scientists rightly ask how long this latter sort of thing must go on. If we are to put up intellectual bars around the country, intended to keep all foreign scientists out and all our scientists in, we will create as much of a barrier to international understanding as if we strengthen and build up tariff and cultural barriers. Some secrecy in connection with the atomic bomb and other military projects is essential, but again we must follow the middle ground. . . . .

"While we must guard our essential secrets, until the necessity for national strength and national secrecy has been eliminated by international organization, we must be careful that we classify as secret only highly important information, and that our attempts to preserve secrecy do not infringe on democratic processes. The experience of history has been that no military secrets can long be kept; in any case, there is nearly always a definite time limit on their importance.

We can, therefore, in attempting to define secrecy too broadly, grasp at a straw of security at the risk of imperiling those things we are attempting to secure. Today, there is still an aftermath of "over-secrecy" left from the war. . . .

"The worst manifestation so far of the secrecy complex that every now and again assails our democracy was a recommendation made recently to the Senate Atomic Energy Committee. It recommended that the espionage laws be tightened by making it a crime for any official to reveal, without authority, any military "secrets," and for any reporter, radio commentator or publisher to publish or broadcast such information. The definitions, as reported, were broad enough to include under military "secrets" many classifications of news of vital importance to the public and to the nation.

This sweeping attempt to dam the source of news is not new; the same measure has been advocated in much the same form at many previous times by the military or the Department of Justice. There is no doubt that such an act would facilitate the task of convicting spies, but it would also tremendously extend the power of government and might well result in restricting greatly the flow of legitimate news. For the act might apply to all official information of almost any character, and under the cloak of such secrecy the checks and balances that a free press and free public opinion provide might well be eliminated. No such act should be passed or even considered. It is truer than ever, in the atomic age, that 'eternal vigilance is the price of freedom'."

McMAHON BILL STATUS DISCUSSED BY "CHEMICAL AND ENGINEERING NEWS"

"A few ill-defined powers granted the military because of a real or supposed international crisis may cause us to lose rights and liberties of the individual won during the past seven centuries," says an editorial on atomic energy legislation in the March 15 "Chemical And Engineering News," organ of the American Chemical Society. Discussing what it terms, "the most important piece of legislation dealing with the rights of man since the Magna Charta, the Constitution of the United States, and the Bill of Rights," the editorial summarizes the status of the McMahon Bill in the Senate Atomic Energy Committee.

Recent statements by President Truman and Secretary of Commerce Henry Wallace favoring civilian control "have given new hope to those who favor positive civilian control rather than direct or implied military supervision of atomic energy activities," says the editorial.

The article concludes, "It should be possible to frame the wording of atomic energy legislation so that top authority rests with a civilian commission, yet with adequate provision for a liason with the military until such time as it is possible to turn over international control to UNO."

70 THOUSAND LETTERS BACK THE McMAHON BILL

According to the Washington correspondent of the New York Times, 70,972 letters had poured in, during the last few weeks of deliberations of the Senate Atomic Energy committee, backing the principles of the original McMahon Bill. Only a dozen letters were opposed.

Letters came from individuals, in the form of petitions signed by thousands, and as resolutions voted by organizations.

Included in the mail were 24,851 letters opposing the Vandenberg amendment before it was rewritten to the satisfaction of military, legislative and scientific groups. Also included were 34,725 who expressed disapproval of the May-Johnson bill, which had been assailed as granting powers far exceeding those specified in the McMahon bill.

REPORTS OF SENATE COMMITTEE TO BE REPUBLISHED ABROAD

A number of foreign countries, it was learned, have become interested in the work of the Senate committee, which has recorded 700,000 words of its non-secret testimony. France has requested, and has received, permission to republish all of this open record, and Great Britain has asked for several hundred copies of the texts.

Some Political Implications of the State Dep't Report

. . . *Edward A. Shils*

The Lilienthal Committee dealing with a political problem of the utmost delicacy has striven to reduce the political element in the Report to a minimum and to confine itself as much as possible to the technical aspects of the problem. Naturally it has been impossible to avoid political issues in the treatment of a subject at the very heart of which lies the alternative-maintenance or parital renunciation of national sovereignty. It is the aim of the following comments to elucidate some of the political decisions which will have to be associated with the ADA if the scheme is to be effective in the preservation of peace, and to examine whether alternative decisions would be compatible with the scheme.

I. Should Sovereign States Possess Bombs?

Although it is not clear whether the Acheson Report intends that the ADA maintain a stockpile of atomic bombs, it is fairly explicit on the proposition that no individual state shall possess atomic bombs—within the framework of the agreement and once the control plan is in full operation. Inasmuch as a group of the most distinguished authorities including Professors Bernard Brodie and William T. R. Fox of the Yale Institute of International Studies have proposed the universal possession by sovereign states of stockpiles of atomic bombs large enough to inflict very severe damage on any atomic bomb aggressor, it is perhaps worthwhile to examine the matter farther. The argument of the Yale group is that complete atomic bomb disarmament would give any clandestine producer of the bomb a great advantage in international relations by enabling it to impose its will on other powers which would suffer for having adhered strictly to the atomic disarmament agreement. Due to the speed with which atomic bomb destruction can be consummated on a grand scale and due to impossibility of closing the gap between prepared attacker and unprepared victim in the way in which the less warlike states did during 1940-1943, successful evasion would be almost a sure step to dominance. And awareness of this fact would give a tremendous premium to all states; even those which otherwise would have adhered with utmost strictness to the agreement would be impelled to undertake clandestine production.

Against this position, what can the proponents of the Acheson report maintain? In the first place, the psychological consequences would be pernicious. The universal possession of atomic bombs would create too high a level of anxiety in international relations, and cause instability of judgment in diplomatic negotiations; anxiety would interfere with the detachment and clarity of mind which diplomats need for success in the conduct of their business. Fear and suspicion of everyone as a potentially murderous aggressor would be intensified—since the retaliatory stockpile could serve only as an instrument of revenge but not as a defense. Minor international frictions already so overstressed by the press would become magnified into major crises in which the total life or total death of the powers involved were at stake. This in turn would lead not to the avoidance of "incidents" but to their multiplication since fearful men are hypersensitive to every move which is allegeable as a threat to their status, power or safety. In the type of anxiety-ridden situation which might result, statesmen might commit even the ultimate irrationality of believing that one can end the crisis by an atomic bomb blitzkrieg against the "threatening" opponent. The anxiety and therewith the irrationality of the populace would probably be heightened even more, and in democratic countries this might have an extremely unsettling influence on the conduct of foreign affairs.

Second, the state of mind which the Yale scheme would create would increase the probability of an armaments race in atomic bombs. Since the Yale group assumes that inspection is not likely to be successful—otherwise, why build up a system based on the expectation of its failure—it is incumbent on it to allow each nation its own facilities for producing additional bombs in a fairly short time in order to allow it to cope with the possible evasion of the original agreement to maintain only a limited stockpile.

(It should be acknowledged that the Acheson Report rests to a greater extent on the omniscience of its staff or the inspection of "safe" installation than the tone of the Report implies. But this is only a quantitative and qualitative personnel problem and is not difficult to solve.)

If each state did not have its own facilities, it could not feel secure since, under the prevailing tensions, there would not be sufficient confidence in the equitable distribution or use of bombs by an international organization. From this stage to the universal atomic armaments race is surely not a long step.

Third, the Yale proposals not only assume the inefficacy of inspection, they actually tend to create situations which condemn it to failure.

The Acheson Report emphasizes that inspection pure and simple would aggravate suspicions but that inspection-cum-research-cum-operation will not do so. This may be arguable but it is not arguable that the latter type of inspection-control system could not work where there is a high level of mutual suspicion and fear. A country which feels threatened by the existence of stockpiles of bombs in the hands of neighbors is likely to resent the presence of members of those other states in the atomic energy laboratories and plants within its own territory, acting as a check on its bomb production at a time when the other states **might** be diverting materials or actually producing bombs. The mutual solidarity of scientists, engineers and other technical personnel which is indispensable for the success of the Acheson scheme will not develop under such conditions.

Fourth, the universal possession of a permitted stockpile of atomic bombs along the lines of the Yale scheme modifies the present balance of power and thus reduces the acceptability of control by the major powers. The Yale group rightly says that any proposal for atomic bomb control will have a better chance of acceptance by the major powers if it leaves the present balance of power in the world unchanged. A peculiar characteristic of the atomic bomb on international relations is that it tends to reduce the margin between previously strong and weak powers if both possess bombs.

Since the Yale proposals are made with the intention of being realistic, it is therefore in order to ask whether the Soviet Union with all its suspicion of the outside world would prefer a system in which a coalition of hostile powers had considerably more bombs than it had—under the Yale scheme, the total number of permitted bombs would not equal the number required to knock out a major power and no single power alone would have more than a minority of the the total number of bombs—to a system in which, thanks to the presence of its own trusted nationals in laboratories and factories everywhere in the world, it could know that the other powers are also without bombs or the apparatus for making them more quickly than the Soviet Union itself could make them. The latter would most probably be chosen, firstly, because it offers more security and second because it promises to maintain the present Soviet position in the world—in which it is as strong as any coalition of powers as long as pre-atomic bomb armaments and political means are used—better than a scheme which would render the Soviet Union inferior in strength to a hostile coalition—which it fears more than anything else in the world. Thus

the assumption of "bomblessness" which underlies the Acheson Report is not only more **idealistic**, it is also more **realistic** than the proposals of the Yale group and it is more likely to obtain the assent of the Soviet Union.

SHOULD THE ADA HAVE A BOMB STOCKPILE?

The Acheson Report leaves open the question as to whether the ADA will possess a stockpile of bombs. Perhaps the authors intended that the matter be decided by the Security Council. But whatever their unexpressed desires on the subject, the chances for the acceptance of the ADA scheme and its successful operation will be best furthered by a decision which prohibits atomic bombs anywhere. If the Security Council or the ADA possess a stockpile of atomic bombs while no other state has them, the incentive to evasion will exist as long as solidarity within the Security Council is as low as it is at present among the major powers and as long therefore as one of them feels it has grounds for distrusting the others. This situation would be much like the present one in which the Anglo-American bloc shares the atomic bomb and the Soviet Union has none in the sense that the Soviet Union would always be fearful that the ADA or Security Council stockpile would be used against it in a severe crisis in which the Security Council might disintegrate. Nor would it be satisfactory for the ADA or Security Council stockpile to be distributed within the various national territories—this would be tantamount to the universal distribution of the atomic bomb dealt with above and would provide the same incentives to evasion, the same stimuli to anxiety and irrationality. The possibility of any of the member states seizing and discharging the bombs stored within its territory would be too great for the sense of security of the other states.

Thus, the ends set forth in the Acheson Report will be achieved best if the proposal which incorporates them is associated with a prohibition of atomic bombs anywhere, either in the possession of the individual sovereign states or in the stockpile of an organ of United Nations, be that stockpile either concentrated in one place or dispersed in a variety of places throughout the world.

II. ADA and the Security Council

The Acheson Report is silent on the relationship of the ADA to the Security Council. This may be due either to the intention of the authors to avoid the intricate and politically hypersensitive problems which any discussion of the Security Council necessarily raises but it might also be due to the desire of the authors to make the ADA independent of the Security Council. The use of the term "Authority" in the title of the ADA and Mr. Lilienthal's important role as Chairman of the Board, permits an inference that the authors of the Report envisaged a fairly autonomous status for the ADA equivalent to that enjoyed by public corporations in contemporary society.

There would be obvious advantages in an autonomous status of the ADA vis-a-vis the Security Council. For one thing, the decisions of the ADA in the allocation of "safe" materials would not be subject to the exercise of the veto power. Thus decisions could be made in terms of human welfare rather than military strategy. Independence from the Security Council would reduce the emphasis on military aspects of atomic energy and would nurture an attitude more sympathetic to the promotion of the peaceful aspects of atomic energy. It is conceivable also that due to the great importance of the ADA in the eyes of the world, its successful operation as an autonomous body would contribute more to the prestige of the United Nations than would be the case if it were subordinate to the Security Council. The Security Council is not likely, in the near future within which the ADA must come into existence, to grow greatly in prestige because if it continues to be the arena of conflict between the major powers, successful reputation-building compromises are not likely to be achieved by the public debates which is one of the main characteristics of the Security Council. Nor if it is the arena in which large powers control small powers, will the reputation of the Security Council as a guardian of peace be enhanced. Association of the ADA with the Security Council will thus involve the ADA in the difficulties of the Security Council and hamper its work by exacerbating the suspicions which will probably also exist among the members of the ADA until it has proved itself to be a genuinely reliable organization for all the parties concerned. On the other hand, if the ADA succeeds, in its autonomous role, in acquiring a large amount of prestige, that will in turn be reflected on to the United Nations Organization and thereby aid it in the fulfillment of its great responsibilities.

Nonetheless, even if the autonomy of the ADA within the U.N were desirable, it does not appear to be an immediate likelihood. The Atomic Energy Commission of the United Nations has in fact already been charged with reporting to the Security Council, by the resolution of of the General Assembly on the 24th of January, 1946. The Commission itself consists of representatives of states which are members of the Security Council plus Canada, and this increases the likelihood that the Security Council will maintain some type of control over the ADA. In addition to this, the ADA decisions will in fact be strategic decisions, not only as regards the geographical location of the laboratories in which military research will be conducted and of the installations using undenatured fissionable materials, but as regards the geographical distribution of "safe" materials as well. Even though the Acheson Report prefers to treat the use of "safe" materials as something relatively uncontaminated with military significance, the fact that de-denaturing can occur and that accordingly a nation with a highly disproportionate share of "safe" materials would enjoy a large lead over other powers, if it decided to abrogate the international agreement and to use its "safe" materials to make them "unsafe" is a fact of considerable military relevance. It is therefore not easily imaginable that such crucial decisions affecting the ultimate safety of individual states will be entrusted to a body in which there is no veto power. Finally, the military research and experimental activities which the Acheson Report recommends should be monopolized by the ADA, are without doubt proper to the jurisdiction of the Military Staff section of the Security Council and not even the most ingenious arguments can change this situation. One solution to this difficulty might however be the formation of a special Department of Military Research and Experiments which, although under the jurisdiction of the ADA, would have a liaison committee with the Military Staff, such as is now proposed in the newly revised McMahon Bill. This type of acknowledgement of the legitimate claims of the Military Staff of the Security Council would perhaps be helpful in reducing the wishes of the Security Council to dominate the ADA in its entirety.

Finally, there should be mentioned one of the most important of all considerations which should make us willing to accept the dominance of the Security Council over the ADA despite certain benefits which might result from their separation. The Soviet Union has, through its official organs, expressed itself on many occasions as insistent on the retention of the veto power. It is the issue on which the Soviet Union is least likely to yield. The hope which the Acheson Report brought into the world will remain hopeful only if it is rapidly translated into reality—delay will certainly reduce its acceptability since the passage of time will reduce the value of the safeguards which it proposes. Hence in view of the adamancy of the Soviet Union on the veto power and the urgency of rapid action on the Acheson Report, it will, all in all, be undesirable to demand uncompromisingly the independence of the ADA from the Security Council.

III. Administrative Structure

Just as the Acheson Report avoids some of the political problems which must be confronted and solved if International Control is to be established successfully, it also avoids the systematic treatment of administrative problems. It is in fact silent on the internal organization of the ADA though it must be acknowledged that this silence does no damage to the Report, since the elaboration of organizational details can be delayed. The special character of the inspection program adumbrated by the Report makes it worth while to explore at least one of the administrative problems, namely, personnel administration.

The almost complete identification of inspection and operation activities means that there will be no major Inspection Department in the ADA. The fact that the inspection of "safe" laboratories and plants will presumably be carried on by members of the ADA staff who are engaged as scientists or engineers in the research and industrial operations will obviously render superfluous a special department to administer inspection. It is rather more likely that the licensing and "safe materials"—allocating functions will be in a single department which will assign scientists or engineers to work for stipulated time periods at the laboratories or plants which have been licensed or granted "safe" materials. (Another department will probably be concerned with the operation of "unsafe" scientific and industrial installations. No inspection will be necessary at these enterprises insofar as the personnel are trustworthy). In the Mining Department the personnel administration tasks will be the same, namely: assignment of carefully selected individuals of diverse nationalities to particular mines which are owned or leased by the ADC.

Since the scientist and engineer inspectors will have to write reports on their observations, a Reports Department will be necessary for their collation and analysis.

There will however have to be a specialized Inspection Branch in the Mining Department, for the conduct of surveys of mines newly opened in different parts of the world to determine uranium and thorium content of the output of those mines. The aerial survey function which will be necessary for the discovery of new mines will likewise fall outside the purey operational or, as the Report calls them, "positive activities" of the Department and will undoubtedly have to have a special branch devoted to its administration. It should be emphasized that some of the inspection activities of the ADA will be exclusively inspectional, e.g. the search for clandestine mining operations, the sampling of the output of non-uranium mines, etc.

This presumed administrative structure will be seen to differ from the administrative structure outlined in Professor Wright's Draft Convention (**Bulletin**, Vol. I, No. 8) which provides for an Inspection Commission separate from the Administrative Commission both of which are subordinate in policy matters to the Security Council, which in its turn acts on the advice of the Atomic Energy Commission. It seems safe to infer that the international administrative problems of the ADA will be simpler than those raised in the Chicago Draft Convention because the licensing, materials-granting and inspectional activities will be carried on through the same department. The internal differentiation of Prof. Wright's scheme would be reduced if it were to provide for ownership and operation of all uranium and thorium mines, and for the operation by an international body of power installations, if and when they are established.

PERSONNEL SELECTION

The major administrative problems of the ADA will, however, rest not on those who are charged with drawing up its organization chart, but on those whose task it will be to devise the proper personnel policies on which the success of the entire enterprise will depend.

Moral trustworthiness, intellectual alertness and ingenuity, and facility in social relations will be qualities without which the scheme will be doomed to failure. Inadequacies in any of these catagories and in others will both reduce confidence in the plan and stimulate and allow evasion. Hence in the last analysis if the proposals in the Report are accepted, the question of successful functioning comes to whether the ADA can abstract and select the kind of people who can do the job.

Under ordinary conditions, when a scientist is to be chosen for a particular scientific task, the criteria by which he is to be chosen are fairly specifiable and applicable; if an engineer is required, the measures of an engineer's ability are also fairly easy to specify and to apply, and the prospects of getting the type of man described are usually quite good. Likewise if one wishes to employ policemen or a secret agent, the qualities which are necessary though more difficult to define verbally and less easy to check, are nonetheless capable of determination. But if one wishes simultaneously to employ a scientist with the alertness of a high-grade secret service agent who will also have the capacities of an ambassador, of a foreign correspondent, and of a professional traveller who is capable of acquiring the main elements of a foreign culture in a short time, and who can come to feel at home in a strange cultural surroundings without insuperable difficulties, then the task begins to approximate the order of magnitude involved in the selection of the kind of personnel required by the ADA.

Fortunately, recent developments in the United States and Great Britain in the application of modern dynamic personality theory to personnel selection provide grounds for optimism. During the recent war, the Office of Strategic Services employed Prof. Henry Murray of Harvard University, who is one of the most outstanding specialists in the study of personality, to develop techniques of selection which would help that organization to obtain men who could be used as undercover intelligence agents, and saboteurs behind enemy lines. (Professor Murray's activities are popularly described in **Fortune Magazine** of March 1946). Prior to Professor Murray's work, the British War Office had begun to apply the results of modern personality theory and research to similar problems and on a universal and highly successful scale to the selection of army officers; more recently the same group who developed the War Office Selection Boards have begun to adapt their techniques to the selection of the Higher Civil Service of Great Britain. These techniques are capable of disclosing important personality traits which the ordinary psychological tests previously used in personnel selection could not perceive. In the research at present being carried on by the Tavistock Group of psychologists and sociologists in London, these selective techniques are being further developed to the point where they can be used for the most diverse professions. The Personnel Department of the ADA will undoubtedly have to adopt these techniques since the success of the plan, to say nothing of the whole future of mankind, will rest on the intelligence, alertness, trustworthiness and social adaptability of the scientist- and engineer-inspectors. However, not only will special techniques of selecting already available personnel be necessary; it will be imperative to train new persons who have met the preliminary personality and intellectual qualifications and who will thereupon be trained in the languages and cultures of the countries to which they will be assigned and in the special skills necessary for the various roles which have to be performed. It is therefore likely that a Staff College, conducted by the ADA or preferably a special Faculty of an International University, conducted by UNESCO, will be necessary for the formation of this unique kind of International Civil Service.

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Repercussions of the State Dep't Report

Proposed Senate Resolution

A resolution urging immediate negotiations within the United Nations to give effect to the State Department report was introduced by Senator Hugh B. Mitchell, Democrat, of Washington. His fellow sponsors were Senators Harley M. Kilgore, Democrat, of West Virginia; Wayne L. Morse, Republican, of Oregon, and J. William Fullbright, Democrat, of Arkansas.

The resolution was referred for consideration to the Senate Atomic Committee, whose chairman, Senator Brien McMahon, Democrat, of Connecticut, was pleased by its aims.

Text of Resolution

Whereas, the secretary of State's Committee on Atomic Energy has issued a report outlining a feasible method for the control of the production of atomic energy by all nations;

Whereas this recommended method does not entail the surrender of any atomic secrets until effective international control protecting all humanity is assured;

Whereas, available evidence indicates that prevention of atomic warfare is the only effective defense against the destructive force of the atomic bomb;

Whereas no nation can be secure when the scientists and industrialists of all nations are free to discover and make atomic bombs;

Whereas, it is necessary to end all competition between nations to make bigger and more destructive atomic bombs; therefore be it

Resolved, that it is the sense of the Senate that the security of the United States and of all nations requires prompt action on an international basis along the lines outlined in the State Department publication entitled, "A Report on the International Control of Atomic Energy," and that negotiations within the United Nations be undertaken immediately upon the basis of the report to the end that its provisions be adopted and a realistic hope of peace be substituted for the present universal fear of mass annihilation through atomic war.

The resolution will serve, in two weeks, as a point of focus for a new series of hearings devoted to the problem of how to cope with the international aspects of control.

Senator Fulbright (Arkansas) supported this resolution in an interview which he gave to the press on April 13:

Urging that the State Department move at once to put into effect its long-term plan for world safeguards against misuse of atomic power, Fulbright said that such action might stabilize U. S. relations with Russia.

He said the plan represents "a real chance" for this nation to show world leadership. The plan is "a good offer to the world."

If such an offer were put forward by this country and rejected by Russia, Fulbright said, it would clearly indicate that the U.S.S.R.'s long-run intentions were not peaceful.

Comments by Members of the State Department Committee

The St. Louis Post-Dispatch has performed a great public service by reprinting the State Department Report in its issue on April 7. In addition, it has solicited comments on the report from the members of the Acheson Committee, the Lilienthal board and from prominent scientists. We print below some quotations from this symposium.

Dean Acheson, Under Secretary of State: "The work of the distinguished Board of Consultants who prepared this report provides, in my opinion, the most constructive analysis that has appeared and a sound and hopeful approach to a solution.

"But even beyond these considerations the report has a deeper significance as a demonstration of the process by which we as a nation can come to grips with this problem.

"The board's report brings to bear upon the problem a painstaking examination of the facts, a patient consideration of alternatives, and a constructive effort to develop proposals in the light of the facts. Not until this process has been widely repeated by the public at large will it be possible to understand the issues and formulate by democratic action a wise national policy and the detailed plans necessary to carry it out."

Dr. Vannevar Bush, president, Carnegie Institution; director, Office of Scientific Research and Development: "The report of the Board of Consultants on the International Control of Atomic Energy is the hard-thought product of extraordinarily able and realistic minds. It makes the best and most encouraging proposals I have seen for dealing with the novel problem posed by our ability to utilize the power of nuclear fission.

"Undoubtedly improvements in various phases of the proposals of the report can be accomplished through further thought of the same high quality. Sincere reasoned discussion of the problem is the duty of every American, and the consultants have made such discussion feasible. For they have laid down a positive, practical, common-sense basis for general consideration and the formation of national policy."

John J. McCloy, former Assistant Secretary of War: "In my judgment, the report is distinguished for its helpful affirmative and practical approach to the solution of the problem of the control and development of nuclear energy. The report, letter of transmittal and Secretary Byrnes' foreword stress the fact which I think all readers should constantly bear in mind, namely, that the report, in substance, only suggests a policy; it is not yet in the form of an articulated or detailed plan. Before it reaches this stage further work by other groups will be necessary, but we have felt that the plan, supplemented by such work, was well capable of this expansion."

Maj. Gen. Leslie R. Groves, executive director, Manhattan Engineer District: "We are at the threshold of a tremendous venture. Recognizing fully that sheer force is not a substitute for moral principles, we must nevertheless insure a safe period for the gradual evolution of sound national and international policies throughout the world. The world needs an interval during which nations can learn to rule and be ruled by intelligence, morals and law; during which all nations will co-operate to create the means by which all peoples may live without fear of being destroyed by wars.

Dr. James Bryant Conant, president, Harvard University: "As a member of Dean Acheson's committee I have already recommended the plan to the Secretary of State for his consideration. As a private citizen may I add my enthusiastic indorsement of the proposal developed by the panel of consultants headed by David E. Lilienthal.

"I believe this plan could be put into effect as suggested by the panel and in the letter of transmittal in such a way as to insure the safeguards necessary to protect this government and the entire world from the misuse of atomic power.

"In the discussion, I trust attention will be focused on the necessity for developing a scheme for removing the atomic bomb as a weapon for surprise attack. If the scheme contemplated can finally be put in full operation no nation would have to fear that without warning its cities might be devastated by atomic bombs. Furthermore, mere operation of the international agency proposed would be a long step forward in strenghthening international co-operation. Once this goal of controlling atomic energy had been reached, it should not be too difficult to provide other ways of strengthening the United Nations organization and eliminating war among great nations."

Repercussions of the State Dep't Report

Opinions of Lilienthal Board Members

David E. Lilienthal, director of the Tennessee Valley Authority said at the National Press Club in Washington on April 10, that this country should start immediately to negotiate for a plan of international control to end the present "atomic armament race." He said the problem would become infinitely greater if action was delayed until other nations had atomic plants and stock piles of fissionable material.

In answer to a question he said no plan would succeed without Russian cooperation, and that atomic plants would have to be built in Russia as well as elsewhere to obtain an atomic balance of power.

Chester I. Barnard, president of the New Jersey Bell Telephone Co., stated in the St. Louis Post-Dispatch: "The plan, if adopted, would have a great chance of successfully accomplishing its purposes. These purpose are to stop and prevent a race for atomic energy armament, to put all nations of the world on an equal basis of protection against the surprise use of atomic energy in war and to insure the peacetime benefits of atomic energy for all people. The plan does not eliminate war nor would it eliminate the use of atomic energy weapons in war, but it would prevent its surprise use.

"Many people will hope and ask for a plan which can be guaranteed to serve these purposes or even larger purposes. This is impossible, I think, not only with respect to this plan but to any other than should be devised. That being the case, one may well ask in this as we do in more ordinary affairs: Why embark on a course involving any risks against which there really can be no genuine insurance? My answer is that the risks of disaster in not adopting this or any better plan that can be devised are very much greater than any risks that will be incurred by adopting it. I do not think the people generally yet realize how great these risks are.

"It is now well known, of course, that there is little or no defense against the destruction of our cities by atomic bombs. What is not sufficiently realized is that because there is no good military defense, our best protection would require a radical rearrangement in our industrial plants, in our way of living and in the geographical distribution of our population. I do not thing it likely that this could be accomplished under a democratic government, for it would involve the most serious interference with the liberties of all of us and would also, I think, require us to accept for many years a dractically reduced standard or living.

Dr. Charles Allen Thomas, vice-president and technical director, Monsanto Chemical Co., St. Louis, said according to the St. Louis Post-Dispatch: "It is of importance that thinking American citizens read this report, study the contents carefully and make up their own minds regarding the feasibility of the proposal.

"One major point in the report will bear repetition—unless a plan such as this is adopted, we may be faced with a constant war of nerves. We are and will be disturbed by rumors of sensational developments in other lands. Without a positive and practical plan for international control of atomic energy, it is quite conceivable that some nation might announce that they have a large stock of extremely efficient atomic bombs. True or not, such a statement would certainly have a most disquieting effect on the other nations of the world. It might lead in our own country to a condition of natural neurosis which would cause fundamental changes in many of the institutions which form the backbone of our democracy.

"If and when such a plan is put into effect and each nation through the Atomic Development Authority, knows what the other is doing on atomic energy developments, the use of atomic weapons as an insidious threat should be eliminated."

Denaturing Fissionable Materials

A STATEMENT BY EXPERTS.

The following statement was prepared by a Committee of Manhattan Project Scientists appointed by Gen. Groves:

"The possibility of denaturing atomic explosives has been brought to public attention in a recent report released by the State Department on the International Control of Atomic Energy. Because, for security reasons, the technical facts could not be made public, there has been some public misunderstanding of what denaturing is and of the degree of safety that it could afford. We have thought it desirable to add a few comments on these points.

The report released by the State Department proposes that all dangerous activities in the field of atomic energy be carried out by an international authority, and that operations which by the nature of the plant, the materials, the ease of inspection and control are safe, be licensed for private or national exploitation.

The report points out that the possibility of denaturing explosive materials so that they "do not readily lend themselves to the making of atomic explosives" may contribute to the range of licenseable activity and the overall flexibility of the proposed controls. The report does not contend nor is it in fact true that a system of control based solely on denaturing could provide adequate safety.

As the report states, all atomic explosives are based on the raw materials, uranium and thorium. In every case the usefulness of the material as an atomic explosive depends to some extent on different properties than those which determine its usefulness for peacetime applications. The existence of these differences makes denaturing possible. In every case denaturing is accomplished by adding to the explosive an isotope which has the same chemical properties. These isotopes cannot be separated by ordinary chemical means. The separation requires plants of the same general type as our plants at Oak Ridge, though not of the same magnitude. The construction of such plants and the use of such plants to process enough material for a significant number of atomic bombs would probably require not less than one nor more than three years. Even if such plants are in existence and ready to operate some months must elapse before bomb production is significant. But unless there is reasonable assurance that such plants do not exist it would be unwise to rely on denaturing to insure an interval of as much as a year.

For the various atomic explosives the denaturant has a different effect on the explosive properties of the materials. In some cases denaturing will not completely preclude the effectiveness by a large factor. The effect of the denaturing is also different in the peaceful applications of the material. Further technical information will be required, as will also a much more complete experience of the peacetime uses of atomic energy and its economics, before precise estimates of the value of denaturing can be formulated. But it seems to us most probable that, within the framework of the proposals advanced in the State Department report, denaturing will play a helpful part."

In conclusion, the experts support the assertion of the report that there is no forseeable method of releasing atomic energy without uranium as raw material, although with uranium, thorium can also be used.

The statement was signed by:

L. W. Alvarez, R. F. Bacher, M. Benedict, H. A. Bethe, A. H. Compton, Farrington Daniels, J. R. Oppenheimer, J. R. Ruhoff, G. T. Seaborg, S. H. Spedding, C. A. Thomas, W. H. Zinn.

Scientists Comment on State Dep't Report

Statement by the Federation of American Scientists

The Administrative Committee of the Federation of American Scientists at Washington issued on April 11 a statement which reads in part as follows:

American scientists are overwhelmingly in favor of the principles of the "Acheson Report", judging from a survey of member associations of the Federation of American Scientists, including "Atomic Scientists" at Oak Ridge, Los Alamos, New York, the Chicago Metallurgical Laboratory, and other research centers from Boston to San Francisco.

Ever since they realized their research would be successful in releasing the energy contained in the atom, physicists have recognized that the problem of controlling and developing this energy wisely for the benefit of all mankind was a world problem.

Scientists are enthusiastic about the Acheson report because in its proposals for a world Atomic Development Authority inspection would go hand in hand almost automatically with development of peaceful uses.

The Acheson Report proposals on the other hand are positive, affirmative, and constructive. They seem to be based on the belief that hope can be as compelling a motive as fear.

We may say that so far as atomic energy is concerned, fear of its power is the beginning of **wisdom.** But only hope and faith in man's future can be the beginning of **action.**

Many of the scientists queried, including outstanding scientists who worked on the atomic bomb, said that they personally would be glad to work for an organization such as Atomic Development Authority. "The world's sympathy and its resources are now mobilized in such organizations as UNRRA," said one. "That is essentially a work of repairing war's destruction. Never in man's history has he mobilized worldwide resources and worldwide intelligence in a particular field of knowledge as is suggested by the Acheson report. It is a revolutionary idea for a revolutionary age. I can not help but think that if it were set in operation it would bring such gratifying results that it would make easier all other steps proposed towards international cooperation."

Comments by Scientists

Dr. A. H. Compton, chancellor, Washington University; adviser on many aspects of the atomic bomb development: "The proposal for international management of the atomic energy presents a sound and constructive basis for solving this difficult problem. In fact, it is the only adequate basis that has yet come to my attention.

"It is not easy, because it involves international control of an important industry, which means an international working agreement on a task of hitherto unparalleled importance.

"It is hopeful, because it reserves an important place in atomic development for private and national initiative, while, at the same time, it gives to United Nations organizations the major responsibility for handling the dangerous aspects of atomic energy.

"An international authority which will carry on throughout the world the 'dangerous' aspects of atomic power development and research, together with its power to carry on the limited amount of inspection necessary to keep safe the 'safe' aspects of this development, gives to the United Nations organization a definite and necessary task, worthy of its growing strength, and for which no other agency is appropriate. I am pleased to note that, step by step, it appears possible for the U.N. to take on complete responsibility for this development, including whatever military policing may be required.

"Until this organization is functioning strongly, I see no alternative but to keep our own atomic weapons intact and ready for use. In the long run, however, our safety cannot lie in our own atomic strength. Before many years, nothing short of a world police capable of preventing outbreak of war can serve as an adequate protector."

Dr. Karl T. Compton, president, Massachusetts Institute of Technology: "It is highly important that every possibility for international co-operation and control of atomic energy be explored. Undoubtedly every plan will have some unpleasant features, but the essential question is: Are there any better alternatives? Some plan must be found and no plan should be finally rejected except on the basis of a better alternative having been found.

"Insofar as I have learned from newspaper reports about the plan proposed by the State Department, it seems to be the only thoroughly considered proposal which has yet been made and to present an effective compromise between the presently impractical suggestion of a world state, on the one hand, and the terrifying prospect of doing nothing, on the other hand."

Dr. F. R. Moulton, secretary, American Association for the Advancement of Science: "In my opinion the report on the international control of atomic energy will be regarded as a great historic document distinguished alike for its scientific excellence and its statesmanship."

Dr. H. C. Urey's endorsement of the report was reprinted in the last issue of the Bulletin.

AMERICAN CHEMICAL SOCIETY RECOMMENDS THE REPORT

The council and board of directors of the American Chemical Society, representing 47,000 American chemists, issued a statement on April 9, commending the report of the State Department's Committee on the International Control of Atomic Energy as "warranting the best thought of the United States."

"The American Chemical Society," the statement says, "is cognizant of the agreed declaration of Nov. 15, 1945, issued by the President of the United States and the Prime Ministers of the United Kingdom and Canada, calling for international control of atomic energy when proper means and safeguards have been established for the over-all protection of the peoples of the world.

"We concur that once a workable plan has been evolved and genuinely embraced by the nations, therein will lie our greatest promise of bringing about international understanding and comity of nations, thus permitting the benefits of this new science to revert to the betterment of mankind. When such a plan can be put into effect, there will be no necessity for 'secrets' and again science will be free and unfettered.

"We are aware of some of the proposals for international control but our council and board feel it is too early to comment on some of them. However, we do unqualifiedly feel that the report on the international control of atomic energy issued under date of March 16 by the State Department warrants the best thought of the United States as we move toward a broad policy."

INTERCOLLEGIATE CONFERENCE URGES UN ATOMIC RULE

Three hundred delegates from thirty-five Pennsylvania colleges approved an atomic energy control recommendation after heated debate, at a recent conference in Harrisburg, stating that nuclear power should be controlled exclusively by a United Nations regulation group.

Dispersal of Cities and Industries

. . . . J. Marshak, E. Teller and L. R. Klein

In an atomic war, congested cities would become deathtraps. A country like the United States with a large part of its population concentrated in big cities along the eastern seaboard is particularly vulnerable to the devastating impact of atomic bombs. Would it help to disperse our cities and industries, to spread homes and plants over the countryside, or even to build underground accommodations?

Of course, such dispersal is costly and means great changes in our way of life. However, two arguments can be advanced in its favor. First, it is a form of defense. Second, it helps to maintain the peace.

In the case of sudden attack, dispersal of cities may mean the difference between extermination of one third of our population and the death of only a few million people. Only! This shows both the imperfection and the necessity of this step toward defense.

Dispersed populations and industries make war less probable and less sudden because the aggressor's gain from a surprise attack is reduced. Suppose, for example, that a dispute arises between the signers of an international agreement. Existence of big cities may then present a tempting target to an aggressor who may even believe that he is acting in self-defense. A surprise attack cannot immediately knock out a country with a dispersed population if an international agreement had insured the world against the existence of large stockpiles of atomic bombs. Thus dispersal of cities may help to maintain the peace by affording a breathing spell during which conciliation may be attempted.

It has been argued that an effort towards dispersal or even a serious discussion of the subject in one country is provocative to the rest of the world. If this argument were true, it would also apply to all other purely defensive measures such as the construction of anti-aircraft batteries. If a country fulfills its international obligation not to make atomic bombs and other major destructive weapons, then the dispersal of cities cannot be conceived as a step in an armament race. In addition, serious discussion of city dispersal will make this and other nations aware of the magnitude of the issues involved and thus more willing to work actively for world cooperation.

To be sure, neither rebuilding our cities nor international treaties can provide more than a temporary measure of safety. Nothing that we can now plan as a defense for the next generation is likely to be satisfactory; that is, nothing but world-union.

VARIABLES OF A BOMB ATTACK

Before we outline a specific plan of relocating the population, it is worth while to define more clearly the factors affecting the amount of destruction. Of these factors, three are controlled by the attacker: the number of bombs, the destructive power of a single bomb (measured by the size of the destroyed area), and the accuracy of aim. Since each of these factors involves expense, the attacker will not be able to increase all three factors without limit. The fourth factor, which is the distribution of the population, is the only one which can be controlled by the defender. The extent to which dispersal can be achieved is limited by the existing inhabitable area of the country and, of course, by the economic cost which we shall discuss later.

It is easily seen that the area endangered by one bomb is greater the larger the radius of destruction. But the endangered area is also larger the less accurate is the enemy's aim. Therefore, on the one hand, it becomes less worth while to disperse population as the destruction radius of bombs increases, while on the other hand, the increasing accuracy of aim makes dispersal more and more advantageous as a defense measure.

In the long run, no great error in aiming accuracy can be assumed on the part of the enemy. Either by developing methods of internal sabotage or by inventing expensive aiming instruments it may even prove possible to detonate bombs with pin-point accuracy. Let us assume provisionally this extreme accuracy. This assumption will enable us to discuss with greater clarity the advantages of the dispersal of cities, and its limitations.

The ideal situation would be to have our population dispersed evenly over the 3 million square miles of our inhabitable area. In this case, each of our 40 million or so dwelling units (including some shops) would be placed in a separate square of 3 million square miles $\div$ 40 million $=$ 1/13 square mile approximately; there would be a distance of about ¼ mile between any two neighbors. Such complete dispersal is, however, not feasible. It would be extremely costly, especially because of the required water, gas and transportation facilities. Also such a scheme would profoundly change our present gregarious way of life—more, it can be assumed, than people would be willing to accept.

But is such extreme dispersal necessary? A bomb of the type dropped on Hiroshima would devastate an area almost a hundred times greater than the plot belonging to one house under a complete dispersal arrangement. It would, therefore, destroy about a hundred houses. If clusters containing a hundred houses each were built, a bomb would not do much more damage than if the houses were dispersed and spaced ¼ of a mile apart.

CLUSTER AND LINEAR CITIES

A considerable part of the protection provided by complete dispersal can thus be obtained even if people live in clusters, provided these are properly spaced. As an approximate rule one might propose that the distance between any two towns should just exceed the diameter of the destruction area of the bomb. Bombs of the Hiroshima type would call for dispersal into evenly spaced towns set, say, 3 miles apart. But as the destruction radius will probably become larger, larger distances between towns, and consequently, since the country's total area is limited, larger towns will be permissible. Let us assume, for example, that a single bomb could destroy an area that a thousand to ten thousand houses would occupy in case of complete dispersal. Then it will be reasonable to have towns of a thousand to ten thousand houses each. The difference in the degree of social and cultural upheaval implied in the cluster scheme as compared to complete dispersal is obvious.

The accuracy with which an enemy can aim his bombs will also influence the number of houses which we may build in one town. The less accurate the aim of the attacker the more can the other country afford to deviate from the ideal of complete dispersal. It can then raise the permissible distance between two neighboring towns further above the destruction diameter of the bomb; thus the permissible size of town population will be raised. Since the improvements in accuracy will take time—apart from bombs in the cellar, of course!—the immediate defense measures can be guided by such relaxed standards.

The amount of protection which the scheme of evenly distributed clusters can provide depends very much on their geometrical shape. "Ribbon" or "linear" cities are safer than round clusters.

If the towns are designed as small round clusters with populations as dense as those in our present suburban areas, then the area of the town will occupy a very small part of each circle of the permissible diameter described above. The

attacker could destroy each town with one well aimed appropriately small bomb and thus not waste much of its destructive power. But if we stretch the same number of houses into a narrow ribbon, the enemy will waste most of the destructive force of each bomb in the agricultural land which borders the city.

The "ribbon" or "linear" city is a good compromise between small round clusters and complete dispersal. If all such cities join each other in more or less parallel, continuous ribbons from East to West and are crossed by another network of parallel ribbons from North to South, we have a mesh of squares. Such an arrangement would make for cheaper transportation and other public services than would be possible for round clusters.

It is, of course, unnecessary that the ribbon cities be laid out in exactly straight lines. It is cheaper to adapt the design to the terrain and to existing major communication lines. By curving the ribbons, we can, furthermore, reduce the ability of the enemy to aim along the direction of the cities.

The best spacing for these linear cities depends on the type of an attacker's bomb. About this it is beyond our knowledge to make definite statements. If it is assumed that the bombs will be of the size used at Hiroshima and Nagasaki, a distance of 25 miles between neighboring ribbons is a reasonable one. A more complete dispersal, that is a smaller distance between ribbons, will become desirable only if smaller atomic bombs and extremely high aiming accuracy should be developed. If bombs become bigger, a lesser degree of dispersal, and therefore, a greater distance between ribbons, could be permitted. In this case, however, the proposed spacing of 25 miles will at any rate be safe even though it is smaller than is absolutely necessary. Distributing our population evenly over these lines which run from East to West and from North to South, we should have 15,000 persons on a stretch of 25 miles between two intersections. This means that there would be about 600 people and 160 houses per linear mile along a communication artery. If an efficient transportation and communication system can be provided, some of the desirable characteristics of big cities can thus be maintained.

If an atomic bomb of the Hiroshima type hits an artery, a stretch three miles long will be destroyed. 2,000 people and 500 houses will be affected. This is more than five times the damage that would be caused in case of complete dispersal. But it will not be very easy to hit the communication lines, and even in the worst case much of the destructive power of the bomb is spent on the open regions between linear cities.

GOING UNDERGROUND

As an alternative to dispersal, it might seem safer to go underground, yet it will not be entirely safe. Atomic energy can possibly be used to excite earth vibrations such as occur in earthquakes. If this excitation should prove feasible, buildings deep underground would be open to attack. However, it is probably true that people in underground structures are the most likely to survive an atomic bombing.

Some underground buildings should be constructed for our immediate defense. Strategic factories, offices, and military establishments which must continue to function in wartime and which require a concentration of people will have to be protected and hidden underground. Such schemes are somewhat reminiscent of the Maginot line. (The ill-fate of that fortification system should remind us that while it may be necessary to build a fort, it is disastrous to place one's faith in strong walls alone!)

It is very difficult to specify the depth at which underground buildings should be located. Three to five feet of concrete will give substantial protection. Only rather close hits will damage such a structure. It will be seldom worth while to build a shield thicker than twenty feet of concrete. As already mentioned, in the case of earthquake vibrations mere depth would give no adequate protection. The geological structure of the layers in which buildings are imbedded is more important. Solid rock would seem safest, but excavation in that material is difficult.

Mountains may be used to afford very considerable protection at reasonable cost. Natural or artificial caves can be protected from above by a much thicker shield than could be afforded for underground buildings in flat land. But the supply of water and ventilation will make any kind of underground construction very costly, even if mountains are used.

In order to carry out an adequate program in a reasonable period of time, we shall have to forego elaborate schemes of underground cities. Sheltered structures need only be used for essentials.

A temporary concentration of people for part of the day will be inevitable, even when the dwellings are dispersed. We shall need factories, shops and amusement places. We should attempt to avoid factories which bring together too many people in one place. This is, in fact, the way in which a large section of modern industry already operates. In numerous small plants, parts are produced, and only assembly work is carried on in central plants. Buildings in which, despite decentralization, a great number of people will have to congregate should be placed underground.

TRANSPORTATION PROBLEMS

With our cities stretched out, we shall have to rely more than ever on our transportation system. Is not a vulnerable transportation system such a serious hazard that dispersal becomes undesirable? It is true that adequate communication is a vital part of the plan. It will be necessary to strengthen the transportation system by having several widely spaced highways and single-track railroads along the ribbon cities, and by making the greatest possible use of air transportation, both by commercial airlines and by private plane. If alternative means of transportation are available, one can hope to keep communications open under heavy attack. The long distance rails and highways should not be along the cities but in the middle between them. Alternatively, about one strip in five might be reserved as a traffic artery only. Triangular instead of square meshes can be used. They would make for faster transportation in peacetime and for shorter detours in the case of local destruction of roads, although the added mileage required would raise the cost of the program.

It is probably not worth while to put railways underground. Subways are less easy to damage, but less easy to repair. Also they cost more and need more time to build. By insisting on underground railroads, we might postpone and thereby frustrate the whole plan. We may, however, have to put underground the most important railroad stations and the intersection points of the network. These points invite the enemy's fire and must not contain surface structures.

COSTS OF DISPERSAL

How much will the rebuilding cost? Let us first consider the cost of a full program, and then discuss the cost of its successive steps, arranged in the order of urgency. The full program would involve an almost complete replacement of our dwellings, industrial plants, other buildings and a considerable part of our transportation system. A very large part of the business establishments consists of movable equipment which can be transferred to the new locations, but factory buildings, blast furnaces, highways, gas and water pipes, etc., would have to be built anew, for the most part.

In estimating the economic burden involved in the program, we are not interested here in the purely financial or transfer costs, such as the cost of acquiring existing land facilities. Such costs are not an economic burden, i.e. they do not require the expenditure of labor or of natural resources.

First, let us consider the problem of rebuilding the residential dwellings in the areas designated for relocation. There

* Urban areas are places with a population greater than 2,500.

were, in 1940, about 21 million occupied dwelling units (apartments or single-family houses) in the United States located in urban areas.* We can put the average construction cost of a dwelling unit at about $5,000 (exclusive of land). Allowing for some increase in population between 1940 and the end of the full relocation program (say, 1955), we conclude that the total cost of the new dwellings would be about $130 billion. With this outlay, every family living in the urban areas could be provided with a new home located somewhere else. As long as cities up to 50,000 are temporarily preserved a sum of about $80 billion will be needed. If only metropolitan districts of ½ million people or more are dispersed or if only certain major key industries, with all their personnel and all the necessary services, are recentralized, the cost is still smaller.

The new dwellings should be built so that the very poorest conform to minimum standards and thus slums are eliminated. However, all families would not get houses of identical quality. The new dwelling units can be distributed by quality among the population subject to minimum standards just as the dwelling units are distributed today according to quality. The figure of $5,000 is an average computed from the construction costs of new houses of different qualities and consequently allows for a wide variety of dwellings.

The cost of constructing dwelling units may be an overestimate for several reasons. We may be able to reduce the average cost from $5,000 to about $4200-4500 by building row houses with one wall common to adjacent houses. Row developments would be quite applicable to the "ribbon" cities that we are considering. It is also possible that the newly constructed houses could be built with materials that are both more suitable and cheaper than brick or wood. Bricks become missiles under the impact of an explosion, and wood is a fire hazard. Newly developed composition boards are safer. They may provide equally good houses at a cheaper cost, if the houses are mass-produced.

Secondly, we consider the costs of relocating our industrial facilities, highways, and buildings. There are numerous considerations which must be brought to bear upon the relocation of industry because we must do the job economically within the framework of safety restrictions. For example, if there is no conflict with the requirements of national defense, manufacturing plants should be located where they have easy access to raw materials and markets—and in such a way as to reduce movements of empty vehicles to a minimum.

We do not have information on the number of industrial units or their construction cost as we do in the case of residential dwellings. However, we do know the present value of the productive plant and equipment in the hands of private producers and of governments. The privately owned plants exclusive of movable equipment amount in value to about $115 billion measured in present prices, and the governments' buildings and equipment, exclusive of the recent wartime acquisitions, amount to about $45 billion, measured in present prices.

We should attempt to construct a plant which is of the same productive ability as the old plant. New facilities are technologically superior to old facilities. We assume therefore, that depreciated plants which originally cost much more than their current value can be replaced by new plants which do not cost substantially more than the current values and which are equally productive.

The figure of $115 billion includes railway tracks and the figure of $45 billion includes public roads. The length of highways and roads needed for the mesh design is not more than the present mileage, although it is designed in a different way; consequently we do not underestimate the building cost of this type of facilities by our method of calculation.

The total cost of the program to relocate all urban dwellings, plants, and nonmovable equipment amounts to about $290 billion, or say $300 billion, a very large figure. We probably cannot carry out a job of this size in ten years, without causing very serious dislocations in our economy. It is true that $30 billion per year for ten years represents a smaller annual quantity of economic resources than that which went into our armaments program, but it is much more than the construction industry at its present size is prepared to handle. At the peak of the war effort, construction amounted to $15 billion per year. We can shift some resources from munitions production to construction and channel the new labor force into the building trades and supporting industries. It seems unlikely that we could raise their annual output in this way to $30 billion without reaching a serious bottleneck or without an all-out effort in training and shifting labor. If we spend $20 billion per year for fifteen years, then the program is more easily within our reach. We could have more consumer goods than we had during the war and still undertake this task.

PRIORITIES OF RELOCATION

Under a fifteen year program we could relocate cities and industries in the order of urgency. Two alternatives present themselves. We can assign highest priorities to the decentralization of the most important key indusries, or we can start with the dispersal of the most vulnerable big cities. If our main consideration is to remove the advantages of an attack the first method is probably to be preferred. One can start with those industries which present particularly attractive targets to the attacker. As another alternative, it would be within our means to relocate all metropolitan areas with populations over 50,000 in the first ten years of the program. The total cost of dispersing and rebuilding the homes and industries of this part of the urban areas is probably not more than $200 billion, an effort which can be accomplished in ten years. We would achieve some degree of safety if all metropolitan areas over 500,000 were dispersed into ribbon cities. The first five years or so of the program should be devoted to these largest cities. As the work goes on, the plan will have to be revised and adjusted to changing conditions and improved knowledge.

The method of financing will have to be the same as was used in the war, namely by taxes, bonds, or both. As in wartime (and as was stated above) it is not the financial method, not the transfer of money that matters, but the full use of labor and natural resources. However, there is a major difference between war and the plan under consideration. During the war, we spent about $300 billion in a shorter time without increasing our stock of wealth. Under the present plan, a similar amount would be spent in rebuilding our country in a better way.

NEW MODES OF LIFE

But we have to consider something else in addition to the cost in labor effort and in natural resources. To live in ribbon cities implies a change in our habits; and the very process of building such cities will temporarily disrupt our lives.

In order to live in ribbon cities we shall have to abandon many of the habits which the people of our big cities have acquired in the course of a century. To be sure, the inhabitants of the new linear cities will not be farmers. Their mode of life will be a suburban not a rural one. They will live near fields but will work in factories and stores. Even if some of their workplaces will be decentralized, life will depend on fast transportation. Is this change in the way of life too high a price to pay for safety? Many modern architects and city planners will probably argue that it is not a price at all; an asset rather than a liability. During the last decades, in the age of the automobile, they have built widely decentralized cities such as the modern Los Angeles. Air travel and cheaper electricity will accentuate the trend even more and our habits would adjust themselves accordingly. Thus, the ultimate change in the habits

(Continued on last page)

Uses of Radioactive Pile Products

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These sources of radiation are radio-active materials formed in the pile, which are concentrated into a small bulk and which may then be shipped away in suitable containers. It is not possible to prepare portable sources which will emit gamma rays with the intensity of the pile itself, nor is it generally possible to prepare strong sources of neutrons. For most purposes, however, such concentrated, portable sources of beta and gamma rays as are available will be convenient and more than adequate.

Radioactive materials may be produced in the pile by two methods: (1) isolation of fission products, and (2) activation of foreign substances placed in the pile. If the desired radioactive element is one of the fission products, it may be secured by removing some of the uranium from the pile and separating the desired fission product by chemical procedures. If the desired radioactive element is not one of the fission products, it can be prepared by putting a normal piece of that element into a thin walled tube which extends deep into the pile. Inside the pile it receives a tremendous bombardment with neutrons, and is thereby made radioactive. The radioactivity thus produced decays away at the normal rate characteristic of that element, so that the radioactivity persists after the material is removed from the pile.

USES OF RADIOACTIVITY

The use of radioactivity falls into two categories: (1) the employment of the energetic and very penetrating radiations emitted by piles or radioactive elements, and (2) the use of the property of radioactivity as a "tag" for the atoms possessing it (the method of "radioactive indicators" or "radioactive tracers").

1. Use of Radiations

Industrial Uses. A number of uses are already known for sources of intense, highly-penetrating radiation. Gamma-ray emitting radioactive materials may be used as cheap, portable sources of radiation for "X-raying" large pieces of metal and other opaque materials for the detection of flaws. They may be used in automatic regulators of various types, in which the radiations can be used to set off control mechanisms. High intensity radiations may have a great effect upon industrial chemistry. Just as sunlight bleaches many coloring materials, so many other chemical reactions—some of considerable importance industrially—can be made to take place when intense gamma-rays are used.

Medical and Biological Uses. Some types of medical treatment involve the irradiation of portions of the patient's body. Certain types of cancer, for example, yield to neutron irradiation, and others to gamma-ray irradiation. Either type of treatment can be given to many patients at the same time if a pile is available. Or gamma-ray emitting materials produced in the pile may be used instead of radium. Such materials will be cheap and plentiful where radium has been expensive and rare. Because of the wide variety of substances emitting gamma- and beta-rays, the substance used can be chosen to fit the particular case. For example, if a short, intense irradiation is desired, a radioactive substance of short life time may be introduced into the desired area. After a short time, it will have disappeared by radioactive disintegration.

Another method of using the radiations from radioactive substances in therapeutic work is by feeding or injecting them in a form which may be stored in the affected organs. Thus, radioactive phosporous has been administered in the treatment of leukemia, being concentrated in the blood-forming organs; and the concentration of radioactive iodine in the thyroid gland has been used to treat thyroid disease. Since stronium tends to be concentrated in the bones, it has been suggested that radioactive stronium can be used in the treatment of bone tumors. These are some of the procedures tried before the war; with the availability of large quantities of all kinds of radioactive materials, from radioactive phosphorous to radioactive arsenic, many more similar uses will be developed.

We must avoid assuming, however, that a universal cancer cure is just around the corner. Some tumors are actually more resistant to rays of all kinds than the normal body tissues, which must, of course, remain relatively undamaged during the treatment. Moreover, there is still no curative treatment for cancer which has become disseminated throughout the body. We are justified, however, in believing that many improvements in cancer treatment will follow the investigation of the use of new radioactive substances, just as experience and wisdom have constantly improved the results from the use of radium and X-rays.

2. Use of Radioactive Materials as "Tracers"

A most important use of radioactive substances depends upon the fact that extremely sensitive instruments (e.g., "Geiger-Muller counters") are available for the detection of the radiations from radioactive materials. It is possible to detect the presence of very tiny amounts of these substances. For example, it is possible to detect a millionth part of a millionth of an ounce of radium. If radioactive material is added to non-radioactive material, it is possible to follow the mixture by using instruments to determine where the radioactivity has gone. For example, it is possible to follow the flow of gas through a complicated system of pipes and reactors, by adding a small amount of a radioactive gas and following the migration of the radioactivity with a "Geiger-Muller counter." This is an example of the simpler of the two types of uses for a "tracer," namely, following the bulk movement of a liquid, gas, or solid.

In the second type of application, radioactive tracers are used to follow a particular chemical component of a mixture. To take a specific example, if copper disappears from a solution as it flows through a system of pipes, it is possible to determine where the copper is being lost. When a small amount of radioactive copper is added to the solution, this radioactive copper travels with the normal copper and is lost at the same place. This region can then be located by using a Geiger-Muller counter to detect the gamma rays emitted by the radioactive copper.

The use of such specific radioactive tracers depends upon the fact that all forms of an element have essentially the same chemical and physical properties. Thus, the element cobalt normally is composed of atoms called cobalt-59. When bombarded with neutrons, another form of this element is made, called cobalt-60, which is a radioactive substance. It has a life time measured in years, and disintegrates by emitting a beta-ray and a gamma-ray. The stable atom cobalt-59 and the radioactive atom cobalt-60, once they are mixed, will travel together through any kind of chemical reaction. Thus, the whereabouts of a large amount of ordinary cobalt (cobalt-59) may be followed by "tracing" a minute amount of cobalt-60 mixed with it.

Industrial Uses of Tracers. Radioactive tracers already have been used industrially to measure the flow of liquids and gases in the manner of the example given above. Thus petroleum engineers have used radium as a tracer to map oil pools. Radium mixed with oil is pumped down a well, and its distribution is measured by its radioactive properties. Because of the great sensitivity of methods for detecting radioactive materials, it is possible to find the radium even after it has become greatly diluted by being spread through a large pool.

Radioactive elements may greatly simplify chemical analysis problems in plant production work, such as the refining of steel. Very often it is necessary to hold up a process until a time-consuming chem-

Uses of Radioactive Pile Products . . . Continued

ical analysis has been made by the laboratory. If a tracer is introduced at the beginning of the process, it is possible to set up simple, quick, and often automatic analyses by radioactivity measurement which will eliminate the usual holdup. Such a process has been patented for following phosphorous in steel refining.

Hydrogen is one of the important elements composing petroleum. Radioactive hydrogen used as a tracer has already supplied valuable information as to what goes on in the process of "cracking" petroleum, a process which produces high-quality gasoline and other valuable chemicals. It has been possible to find out a great deal about what occurs to the complicated molecules comprising petroleum during the cracking process, and such knowledge inevitably leads to improvements and new developments.

Chemical Resarch Uses of Tracers. The use of tracers in general scientific research will certainly expand tremendously as soon as the materials are available. The organic chemist, for example, is concerned with a vast number of compounds composed to a large extent of carbon and hydrogen. As mentioned before, a radioactive form of hydrogen is available; a radioactive carbon has also been made. With these two, the organic chemist may be able to determine just what happens to organic molecules when he heats them, or boils them, or causes them to react. With such knowledge, he can learn how to make them more easily, and more cheaply; and he can learn how to make more and more useful compounds. Considering that a very great portion of our chemical industry is based upon organic chemistry, basic advances in this field are sure to exert great influence. This is only an example of what the availability of radioactive tracers for all the elements can mean to chemical research.

Biological and Medical Uses of Tracers. One of the important uses of tracers in biology and medicine is to find out how the human body functions. It has been the experience of the past, that when such knowledge is available, methods of devising cures for diseases are greatly simplified. When bacteria could be identified under the microscope, the attack on bacterial diseases became much easier. The use of tracers made by cyclotron bombardment has already revolutionized much biological and medical research, because experiments may be attempted which are impossible without tracers.

Some of the uses of radioactive tracers are fairly obvious. Thus, the rate at which the blood flows through arteries and veins can easily be measured by injecting the tracer at one point and measuring the time which elapses before it arrives at the point where the detecting device is placed. In a similar fashion, the rate at which sap rises in plants may be found directly.

The concentration of a substance in a certain part of the body can be directly demonstrated. The accumulation of iodine in the thyroid can be shown by placing a counter on the neck after radioactive iodine is administered. This method has been used to study the nature of various diseases of the thyroid, in which the gland may be avid for iodine, or may refuse to store it. It is also possible to determine, by injecting a very small amount of radioactive iodine into a patient with thyroid cancer, whether it is worth while to treat the patient with a much larger amount, or whether operation is called for.

These and similar uses of radioactive tracers hardly scratch the surface of the possibilities. Minute, non-poisonous amounts of drugs, vitamins, and poisons can be followed around in the body by the radioactive tracer method, because of the great detection sensitivity. "Tagged" drugs will shed new light on the site and mode of action of therapeutic agents (such as the "sulfa" drugs and penicillin) and allow a totally new approach to medication. Moreover, the greatest value of this method lies in what it can tell us about those normal body processes whose investigation defies ordinary chemical methods.

We know, for instance, that the body continually requires food, that a great variety of foods must be eaten, and that some are "burned" in the body and produce heat. We have found out, by very difficult and painstaking experiments, the identity of a great many of the chemical compounds which are formed in the body from the food originally taken in. If we analyze an organ at two different times, the analysis often does not show any appreciable change, so that is it usually impossible to tell what has been happening between these two analyses. All of the subtle vital processes can be studied relatively easily and in great detail by using tracers, for we can make one of the normal body compounds in a radioactive form, administer it, and then follow the complete history of the "labelled" molecules. The course of phosphorous in the body has been traced in great detail in this fashion.

This method has already shown that many of the structures of the body, which had always been considered to be stable, are really changing, breaking down and rebuilding, at great rates of speed. These changes can now be watched, and it is fair to say that the method gives us a wholly new conception of body and cell processes. Such a revision of our basic ideas leads in turn to changed interpretations of health and disease, greatly affect ing medical practice.

In plant biology, the tracer method has already shown itself to be of great importance. One of the most puzzling and important problems of science is "How do plants manufacture sugar out of carbon dioxide, water, and sunlight?" If man could duplicate this process of "photosynthesis," first in the laboratory and then on an industrial scale, the bountifulness of the earth might be greatly multiplied. The world's fuel and food supplies would be assured as long as the sun continues to emit light. A most powerful tool at the disposal of the chemist and biologist for understanding, and perhaps eventually duplicating photosynthesis, is the tracer, radioactive carbon, which has been mentioned before. If, as a result of our greatly increased production of radioactive carbon, the riddle of photosynthesis is solved, that, and not power plants or atomic bombs, will stand as the greatest achievement of atomic energy release.

SUMMARY

The most significant uses of artificial radioactive materials will be in laboratory researches in which the tagging of atoms through their radiations will enable technical advances to be made whose very nature cannot be predicted at this time. Just as the experiments of Fermi in 1934 led, all unexpectedly, to the production of the atomic bomb and other atomic energy sources in 1945, so the final results of such "tracer" researches and their influence on life even a few years from now cannot be adequately anticipated. But the effect will be great. A necessary condition for obtaining these benefits, however, is an enlightened attitude towards the control and release of radioactive materials and information concerning the methods for using them.

For the purposes of manufacturing radioactive materials or for using pile radiations, it is not necessary to have piles which can supply industrial power. Piles incapable of delivering useful power can still supply adequate amounts of radioactive materials to all users and can also serve as strong sources of gamma and neutron radiation. In order to simplify the problem of international control of atomic weapons, it may be considered necessary to delay for a time the use of atomic power on a large scale since the power installations may be used to form quantities of fissionable material which could be used in bombs. Even if this postponement occurs, it will not be necessary to delay at all the great benefits derivable from the use of radioactive materials.

First Power Pile To Be Built at Clinton

A press release on April 12 by the Manhattan Engineer Project revealed that an experimental atomic power plant is to be built at the Clinton Engineer Works at Oak Ridge, Tennessee.

In broad and general terms the new pile will employ scientific principles utilized in the Chicago pile where the first chain reaction in history took place, the Clinton Laboratories pile, where the first experimental quantities of plutonium were made, and the full-scale pile at Hanford, Washington, where plutonium is produced. But unlike the others, which were made specifically to produce plutonium, the atomic power plant will have as its primary purpose, the generation of heat energy and the conversion of that energy into electricity.

The pile will be based on investigations carried out at the Metallurgical laboratory of the University of Chicago on the initiative and under the leadership of its present director, Dr. Farrington Daniels,

The Monsanto Chemical Company will have the overall authority and responsibility for design, construction and operation of the plant.

Dr. Charles Allen Thomas, Vice-President and Technical Director of Monsanto, will be in charge of the project. He headed studies in the chemistry and final purification of plutonium and since July 1, 1945, when Monsanto succeeded the University of Chicago as operators of Clinton Laboratories, has been in general charge of Clinton Laboratories. Dr. Thomas also is one of the members of the Lilienthal board responsible for the State Department Report on international control of atomic energy.

General Groves stated that "Assignment of the work to private industry is in keeping with the line of policy successfully pursued in the Manhattan District work to date."

A meeting was held April 11 in New York to formulate plans for organization and to secure the cooperation of the many diverse organizations necessary to develop atomic energy for power purposes. Representatives of the Manhattan Engineer District, the Army Air Forces, U. S. Navy, Monsanto Chemical Company, the Metallurgical Laboratory of the University of Chicago and Allis-Chalmers, General Electric, and Westinghouse, industrial firms that helped develop the atomic bomb, attended the meeting.

It is expected that actual construction will get under way this year. The initial expenditure for the experimental unit has been tentatively placed at two and one half million dollars. The pile may be ready to operate sometime late this year, or early next year.

The release stressed the experimental character of the new pile:

"Although the plant will produce some electricity it probably will not be an economic unit for such production and is not so intended. This is to be a pilot plant: a research tool from which knowledge will be derived for subsequent development and exploratory work. It must, therefore, be used in the light of a scientific and engineering experiment rather than an economically practical application of nuclear fissions for generation of electricity.

Primary consideration is the need to reduce to practice some of the many ideas for power piles developed as an outgrowth of the atomic bomb program and to supply evidence that might be of value in clarifying any international patent situation that might arise. Patent rights growing out of the work will be vested with the government of the United States and Congress will determine the use to which they will be put.

ATOMIC BOMB TESTS

BIKINI TEST PLANS

After the postponement of the first Navy test from May 15 to July 1, considerably congressional opposition developed to holding these tests at all. Senator Huffman of Ohio introduced a resolution requesting President Truman to abandon the experiments. He was supported, among others, by Senator Lucas of Illinois, and Senator Walsh of Massachusetts, Chairman of the Committee on Naval Affairs. The Huffman resolution was tabled, and Senator Huffman may ask the Senate to call it up at any time. On the other hand, the necessity of the test for the determination of future defense program was strongly defended by military and naval authorities. Supporting their attitude, President Truman issued a statement on April 12 announcing that the tests will be held as scheduled:

The President's Statement

Preparations for the atomic bomb tests in the Pacific are being pressed forward and I have been assured that the present target dates for the explosions will be met. I am in complete agreement with the Joint Chiefs of Staff and the Secretary of the War and the Secretary of the Navy in their view that these tests are of vital importance in obtaining information for the national defense.

Without the information from these experiments, designers of ships, aircraft and military ground equipment, as well as our strategists, tacticians, and medical officers, will be working in ignorance regarding the effects of this revolutionary new weapon against naval and other targets not previously exposed to it.

These tests, which are in the nature of a laboratory experiment, should give us the information whirh is essential to intelligent planning in the future and an evaluation of the effect of atomic energy on our defense establishments.

Senator Huffman asserted that, despite the President's statement, he still would press for passage of his resolution.

The bill authorizing the use of ships for the atom bomb tests has been sent back to the Naval Affairs Committee for revision of the target ship program. This step was caused by criticism of the large number of ships scheduled for use in the first test according to the original plans. Senator Walsh said on April 12 that he expected the number of ships to be reduced from 100 to 71.

NAVY ANNOUNCES BOMB TEST EVALUATORS

The seven members of the Joint Chiefs of Staff Evaluation Board for the atomic bomb tests to be held at Bikini Atoll in July were announced on March 28. They are: from the Army, Gen. Joseph W. Stillwell and Gen. Lewis H. Brereton; from the Navy, Vive Admiral H. H. Hoover and Bradley Dewey; and one civilian from the Army's Manhattan District, T. F. Farrell.

A LAND TEST?

A proposal that the atomic bomb be tested on a mock city as well as on a fleet in Pacific waters was made on April 8 by Dr. Karl T. Compton, president of the Massachusetts Institute of Technology. It is more important to know what the atomic bomb will do to a land target than it is to know what it will do to a sea target, Dr. Compton said.

He advocated the construction of a "city" in some uninhabited place, consisting of walls and roofs containing every known kind of structural material so that the effects of the bomb on them might be determined.

LIE PRODS ATOMIC ENERGY COMMISSION MEMBERS

Trygve Lie, Secretary General of the United Nations, called on April 4 on the laggard member nations of the Atomic Energy Commission to appoint delegates, in order that the business of devising world control of atomic energy may be begun in earnest as soon as possible.

Those nations which have not yet appointed delegates include China, Mexico, and the Soviet Union.

The British Atomic Energy Project . . .

The difficulties encountered in the development of the new British Atomic Energy Project at Didcot, England, have been mentioned in John Simpson's article in the last issue of the Bulletin. Additional interesting details on this Project were given by Peter Whitney, in a report to the Chicago Sun.

. . . .

Near the little village of Harwell, five minutes' drive from Didcot in the Thames Valley, is a Royal Air Force airfield which eventually is to become Britain's central atomic research plant.

Plans to this effect were announced last Oct. 29, but Harwell still is an R.A.F. airdrome.

A cloak of secrecy, enforced by Britain's painfully honest Civil Service and inflicted on unwilling scientists, keeps Harwell's progress, or lack of it, out of the papers and out of the people's minds.

The R.A.F. policeman at the gate won't let any newspaperman into Harwell without a permit from the Ministry of Supply, and the Ministry of Supply won't issue permits.

"There's nothing to see there anyway," an official said blandly. "We haven't even got a hanger to ourselves yet. They're trying to arrange for space in a corner of one of the hangers for the time being."

Nonetheless, a staff is being recruited through regular Civil Service personnel, salaries beginning at 275 pounds—$1,100—a year.

Even when it gets under way, Harwell will be no Manhattan Project. The station, Attlee told the House, will cost an initial $4,000,000 and will cost $2,000,000 a year to run.

Under the circumstances, small wonder that some voices in Britain have been raised in complaint that the government is half-hearted, that Sir John Anderson, its principal adviser of atomic questions, is a pinchpenny Scot, and so forth.

Capt. Raymond Blackburn, young Labor M.P., has distinguished himself in this new Parliament by persistent and knowledgable questions on atomic matters. He has estimated the cost of an atomic research project "sufficient to insure the industrial future of this country against the competition of any other power" at $135,000,000.

The designated director of Harwell, Prof. J. D. Cockcroft, is on loan to the Canadian government, for whom he is director of atomic experiments. Announcing his appointment in the House, Attlee said that "it has been arranged with the Canadian authorities that he is to remain in Canada for the present."

Challenged on the slow motion of the government's atomic plans, Attlee's answer always has been: "We are co-operating in this matter with the United States and Canada, and the House will understand that no statement can be issued without consultation with them."

What Britain's leaders evidently are thinking is that the country cannot afford now this enormous expenditure on a purely military basis; the money is needed to rehabilitate British industry and pay back British debts to the outside world.

Meanwhile, research on a scale that would have seemed very handsome before the war can be carried out, until the actual industrial potential of atomic fission is ascertained.

But first, as Attlee discreetly indicated to the House, Britain's main effort for the time being must be to obtain uranium ores sufficient for research. A special division of the Supply Ministry, under the top-flight leadership of Lord Portal, wartime commander in chief of the R.A.F., will have that job.

Shils on State Dep't Report . . . . . Cont.

(Continued from Page 7)

If there develop strong cultural and psychological resistances among scientists and engineers to this arduous inspectional work as a life-long career, then the Personnel Department will have to face a situation in which appointments will be for short-terms and in which therefore it will be necessary to recruit a much larger number of persons. This will make the burden of personnel selection, administration and training a much greater one, but it may be the only way in which the interests of men of high quality will be satisfied and their services won for the ADA.

Special care will have to be given by the Personnel Department to the assignment problem. Scientist- and engineer-inspectors will have to be chosen not just with reference to their technical suitability and their adaptability to the culture of the country to which they are sent. They will also have to be acceptable to the States whose security will rest on the reliability of the inspectorate. One of the ways to do this will be to guarantee minimum representation of various nationalities in the ADA missions to the member States so that each State and people will be able to feel that its safety in other countries is being watched over by its own nationals. Again this will provide subtle problems for the recruitment officers of the ADA who will have to discover personalities who possess in addition to technical qualifications, that type of detachment and balance which will harmonize loyalty to one's own country with loyalty to an international institution and to mankind at large. Otherwise, they will not be acceptable.

Conclusion

The Acheson report provides not only a central scheme but a series of steps for its realization. Great political dangers are resident in this type of inspection and the succession of these steps. Until the consummation of the last step, the United States will retain the monopoly position which is at present one of the disturbing factors in the international situation. As long as this monopoly exists other states will have a very strong incentive to prospect for uranium, to conduct militarily relevant research and experimentation and to build up stockpiles of fissionable materials and bombs, if they are able. If the various states have time to build up stockpiles or plants or laboratories before the inspection scheme comes into operation, then subsequent detection will be extremely difficult for the type of inspection envisaged in the Acheson Report. Already existing stockpiles and equipment which are not voluntarily disclosed are detectable only by "snooping" which the Report regards as repugnant and as something to be kept at a minimum. (Actually, more of this will be required than the Report is willing to acknowledge.) But if the United States were to renounce its monopoly without concern for the simultaneous establishment of the international control scheme, the military security of the United States would be reduced. Nor would it be reasonable to expect the American people or their government to acquiesce in the renunciation of their cherished secrets without a guaranteed return.

We will discover the resolution of the dilemma when we recognize the burning urgency of the problem. In August of last year, Mr. Churchill in the House of Commons said that we have very few years in which to remake human relations or to await destruction. The Acheson report, with its proposals for new tasks for an international scientific elite, aware of and bearing its heavy responsibilities, and for totally new and fertile types of international institutions is a great and noble contribution to the remaking of human relations for which Mr. Churchill called. Its fruit will however wither unless the American people and their government proceed with the greatest speed to discuss, understand and accept the proposals of the Report and then by their prestige, power and wealth obtain its acceptance by the other major states of the earth before it is too late.

Dispersal of Cities

(Continued from Page 15)

of life is perhaps not a serious price to pay for safety.

The difficulties of the transition are probably less acceptable. It will require much government regulation. We have just gone through a war which has required an increase in the government interference in our life. The government allocated raw materials and regulated the flow of labor. The rebuilding of cities and industries will similarly require the allocation of space; the government in cooperation with management and labor will have to decide about the best location for the key industries, and the order of urgency for their decentralization. The master plan of network cities and communications will have to be adopted in advance. But we need not decide now how much can then be left to the free and automatic flow of labor and enterprise which will follow the relocated key industries along the main communication arteries. This decision will depend upon the time allowed for the completion of the program. The shorter the time, the less can we rely on the free movement of labor and the free planning of private enterprise.

We are in a grave situation. We shall have to use all our intelligence and all our industry to save human lives. One part of this difficult task may be to rebuild a large part of our homes and plants. It is possible that we cannot do this without government regulations, just as restrictive or more restrictive than those of the recent war years. We may have to comply for the sake of temporary safety in order to gain time in which to establisn understanding, friendship, and firm unity between nations.

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KANSAS MEETINGS

A tour including eight Kansas towns was arranged by the Volker Foundation at the University of Kansas; Mr. Hilden Gibson of the Department of Sociology was in charge of the arrangements. Six scientists from different laboratories,—L. Borst, T. Jorgensen, D. Hill, H. Brown, D. Hume, P. Henshaw and J. Nickson—participated in the tour.

The program included morning, afternoon, and evening sessions at Kansas City on April 1, Topeka on April 2, Sabina on April 4, Hays on April 5, Dodge City on April 6, Wichita on April 8, Chanute on April 9, and Pittsburgh on April 10.

The audiences included selected community leaders; they were not picked with an eye to any particular political leanings.

The scientists who participated in the sessions were impressed by the open-mindendness of the audiences, their eagerness to be informed and willingness to consider the situation on its own merits, without reference to nationalism, internationalism, isolationism, and similar general attitudes.

Resolutions supporting the Acheson report and civilian control of atomic energy were passed, and standing committees on atomic energy were established in several communities.

The scientists who took part in the trip agreed that it was very effective in spreading information and awakening the interest of the country. They suggested that similar programs should be carried out in as many other states as possible.

BOMB MAKING HOLIDAY SUGGESTED

Twelve professors of the Columbia University at New York have suggested, in a letter to the New York Times, that in order to improve the atmosphere for the discussions of the UN Atomic Energy Commission, the United States government should cease the production of atomic bombs and interrupt for one year the production of pure plutonium and uranium 235. The signers are L. C. Dunn, I. Edman, A. P. Evans, Selig Hecht, P. C. Jessup, R. M. MacIver, Edgar Miller, F. C. Mills, George B. Pegram, I. I. Rabi, Jan Schilt and C. S. Shoup, professors, respectively of zoology, philosophy, history, biophysics, public law, sociology, biochemistry, economics, dean of graduate faculties, physics, astronomy and economics.

TWO NEW YORK GROUPS MERGE

As a result of the gradual liquidation of the New York Laboratories of the Manhattan Project, the members of the Association of Manhattan Project Scientists, New York City Area, have merged their organization with the city-wide Association of New York Scientists. At a joint meeting of the two organizations, the following Executive Committee of the combined organizations was elected: Clarke Williams (Chairman), Hugh Wolfe (Secretary), Nordsieck, Philips (Trischka as alternate), Gregerson, Grundfest, Mirsky, Spock, Kirk, Swartz, Rosenberg, Adler, Murphy and Kaplan. I. Kaplan has been designated as the ANYS representative on the FAmS council.

FAmS COUNCIL MEETS

A meeting of the Council of the Federation of American Scientists is to take place at Pittsburgh, on April 20-21. The main topics of discussion are the attitude towards the McMahon bill in its present form and the appraisal of the State Department Report on the International Control of Atomic Energy. Proposals pertaining to future educational program of the Federation and organizational reforms also will be discussed.

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